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NOTICES.

The subscription is 10s. per annum if paid in advance, or 12s. on credit, payable in two sums of 6s. each, due in June and December of each year. All subscriptions commence from the 10th of January.

All communications and orders for Advertisements to be addressed to the Editor, 32, Bucklersbury, London.

Back numbers exceeding three months' date will in future be charged double price, unless six or more consecutive numbers are taken at the same time. Nos. 6, 15, 18, and 23, are out of print; and Nos. 24, 25, and 26, can only be had with the entire series, forming volume 2.

The Editor will be particularly obliged by his friends forwarding to him Notices of all Meetings, Trials, or Appeals, which it may be interesting to the Gas World to have reported.

Circular to Gas Companies.

Amalgamation and its attendant benefits are again the general topic of conversation in the chief industrial circles of this country and of Europe. Four great continental railway companies are just consolidated into one, stretching its arms over the centre and to the south and west of France. Six important Parisian gas companies are tempted by the municipal authorities into a fusion of their interests, by the offer of a 32 years' monopoly of the supply of gas to the citizens of Paris. Nearer home we see the heads of the three greatest English railway companies all advocating the same cause, though minor differences may exist between them as to the best means of carrying such views into effect; and, more strongly illustrative still of the soundness of the policy we have uniformly advocated, we find the junction of the Commercial and British Gas Companies followed by an advance of 25 per cent. in value of the shares of the former—an advance which will go far to make up to the British shareholders, who have taken shares in the Commercial, the loss they have sustained by the sale of their works and property. It is surprising that, with such instances before them, the shareholders in the metropolitan gas companies do not take the initiative in a general amalgamation, such as we proposed nearly four years since. That there is a field for such an operation is amply proved by the following quotations from "Crosley's Share List," at three periods—in 1848, 1849, and 1852:—

Paid up.		Jan. 1848.	Jan. 1849.	Sept. 1852.
£ 25	Commercial	£ 25 to 26	£ 25 to 26	£ 30 to 32
150	City of London....	285 to 290	240 to 245	124 to 126
50	Chartered	58 to 59	48 to 49	36 to 37
50	Equitable	38 to 39	33 to 35	25 to 26
50	Imperial.....	80 to 84	62 to 64	75 to 80
50	Independent		60 to 62	46 to 47
50	London (Vauxhall)		10 to 20	2½ to 3
50	Do., preference....		20 to 30	15 to 18
49	Phœnix	35½ to 36½	28 to 30	26 to 27
90	Ratcliff	78 to 80	72 to 74	60 to 65
25	South Metropolitan	28 to 30	21 to 23	20 to 22

It will be observed that the Commercial shares are the only ones bearing a higher price at the present time than they did in Jan., 1848.

Some sensation has been created in the metropolitan gas world, by the rumour of the discovery of a large number of service-pipes having been systematically and designedly inserted by the agents of one of the companies into the mains of their competitors. No imputation of complicity in such a scandalous system of robbery is made upon the respectable gentlemen who now conduct the affairs of the delinquent company, but, as the matter will probably undergo a public investigation, it would be premature in us to enter into further details at present. The possibility of such practices being carried on with impunity for several years, furnishes an additional argument in favour of the fusion we have already alluded to, or, at all events, suggests the necessity for an immediate understanding between the companies, so that the proper agents of those having parallel mains in any district may be present whenever a new service-pipe is laid on, or an old one altered; in fact, whenever the ground is broken up for any purpose connected with the supply of gas.

A "Blue Book," of some 670 pages, in the shape of a report from the select committee appointed to consider the best means of improving the ventilation and lighting of the House of Commons, has just made its appearance, and bears convincing evidence that the lighting and adequate ventilation of a large hall of assembly, where the occupants vary in numbers and in temperament, is one of the most intricate tasks ever undertaken by a man of science; and that the principles upon which it should be based are as little settled amongst the school of what have been termed "domestic engineers" as when the elder Sylvester first put forth his views thereon. We purpose publishing the Minutes of Evidence given before the Committee, from time to time as we can find space for it, reserving our observations upon it till the whole is before our readers.

We have lately been much gratified by an inspection of Mr. Goddard's ingenious portable asbestos gas stove, which may be seen in operation at his agents', Messrs. Hare and Co., 31, Essex-street, Strand. For compactness and simplicity of form, economy in first cost and consumption of gas, as well as efficiency in its calorific power, it is superior to anything which has yet been brought before the public, and must materially aid in augmenting the domestic consumption of gas wherever the price is moderate in comparison with the cost of other fuel.

Communicated Articles.

MR. J. E. CLIFT'S FIRE-BRICK GAS RETORTS.

READ BEFORE THE INSTITUTION OF MECHANICAL ENGINEERS, JULY 28, 1852.

The object of this paper is to describe a plan for constructing Gas Retorts, which the writer has had in use several years at the works under his management, and has also adopted at various other towns; and the only apology he has to offer for bringing it before the meeting is, the request of the Council of the Institution to furnish the practical results of the working of the plan.

The first great desideratum in a gas-generating retort is, on all hands, acknowledged to be *surface*—a large surface, upon which

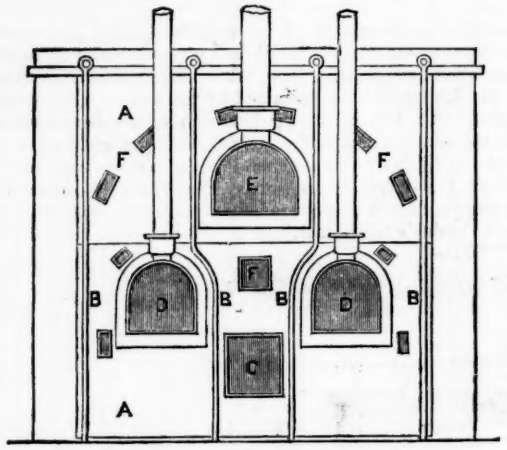


Fig. 1.—FRONT ELEVATION. Scale 1-40th size.

may be spread a thin layer of coal; this was early shown by Mr. Clegg, in his invention of the revolving-web retort, the only difficulty in working which was the destructible nature of the material of which it was composed.

The second condition required is, that this large surface shall be *economically heated*. A strong opinion existed for a long time against the use of fire-clay for retorts, in consequence of the inferior heat-conducting properties of that material compared with iron; but experience has proved that as large a quantity of gas can be generated, with a given weight of fuel, with fire-clay retorts as with iron. This may be accounted for partly by the fire-clay losing less of its heat on being exposed to the air whilst charging, and on the cold charge of coal being first thrown in; or, in other words, that the greater mass of fire-clay acts as a reservoir of heat, and does not become so readily exhausted when a large demand is made upon it, but, on the contrary, maintains a greater uniformity of temperature throughout the process; this is easily demonstrated by observing the small quantity of gas made from an iron retort during the first hour after charging compared with a fire-clay one. It is also partly accounted for by the iron retorts, as they are generally set, being so covered and shielded with fire-bricks, to preserve them from destruction, as to partake as much of the character of clay retorts as of iron.

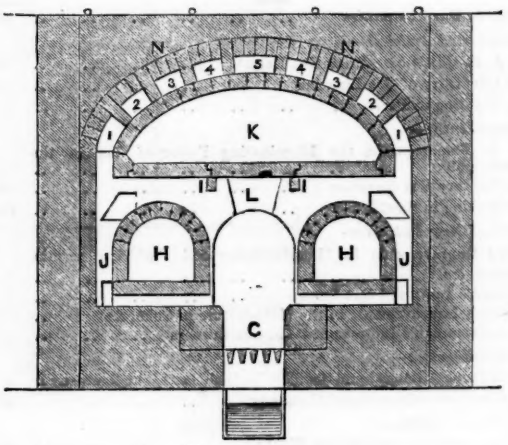
The following table, which is the average of a number of experiments, gives the quantities of gas generated, as indicated by the meter, from iron and clay retorts, during each half-hour of the charge, from the same quantity and quality of coal:—

½-hours.	Iron Retorts. cubic ft.	Brick do. cubic ft.
1	250	480
2	630	1800
3	1340	2000
4	2300	2000
5	2600	2300
6	2640	2300
7	2600	2460
8	2600	2400
9	1700	2000
10	1630	1630
11	1790	860
12	700	550
	20,780	20,780

The third requisite in a retort is *durability*. The proper way to measure this element is to divide the quantity of gas made by the cost of the retorts and ovens, and the repairs during the time they are worked; this will be shown presently by a comparison from the actual working of iron and clay retorts.

The retorts to be described in the present paper are composed entirely of fire-bricks, with cast-iron front plates to attach the mouth-pieces to, and to bind the brickwork together, and they are made of any length, width, or height. They are generally constructed in sets of three, as shown in fig. 1, which is a front elevation. A A, are the front plates of cast iron, 1⅛ inch thick. B B, are the wrought-iron stays, 4 × 1½ inch, fastened at the bottom by cramps built into the brickwork, and at the top by tension bars, connected to similar stays on the opposite side. C, is

Fig. 2.—TRANSVERSE SECTION. Scale 1-40th size.



the furnace door. D D, two retort mouth-pieces, 15 × 15 inches. E, a large retort mouth-piece. F, sight holes for examining the flues and cleaning dust from the external surface of the retorts.

Fig. 2 is a transverse section; G, is the furnace; H H, are the two lower retorts, 15 inches wide, 15 inches high, and 20 feet long, with a mouth-piece at each end. The fire-bricks forming the bottoms and sides of the retort are 16 inches long and 3 inches thick, and the arch-bricks forming the top are 9 inches long by 3½ inches deep. Each brick is rebated 1 inch deep in the transverse joints, and grooved in the longitudinal joints, as shown by the enlarged drawing, fig. 3; these grooves are filled with stiff fire-clay when they are put together, which burns into a hard tongue half an inch thick as it becomes heated; the object of these tongues is twofold—they offer a resistance to the leakage of the gas by breaking the joint, and they tie together the arch of the retort.

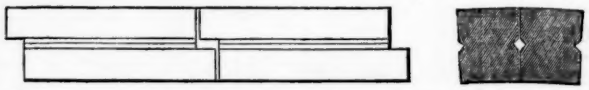


Fig. 3.—DETAILS OF BRICKS.

K is the large upper retort, 5 feet 3 inches wide, and 20 feet long, open for charging at both ends; the bricks are similar to those forming the small lower retorts; L is a cross arch, 5 inches thick, spanning the furnace flat on the top, which covers the underside of the transverse joints of the bottom of the large retort; the longitudinal joints are covered by small arched bricks, marked I. J, are the side flues, and N the longitudinal flues shown more fully in figure 4, which is a plan of the top of the upper retort, showing the course of these flues. In rising from the furnace the heat passes partly underneath and partly over the small retorts into the first flue, No. 1, moving to the back of the oven; then crosses the division and returns to the front along the second flue; then to the back along the third flue, and to the front along the fourth, when it meets with the heat which has gone through a similar course

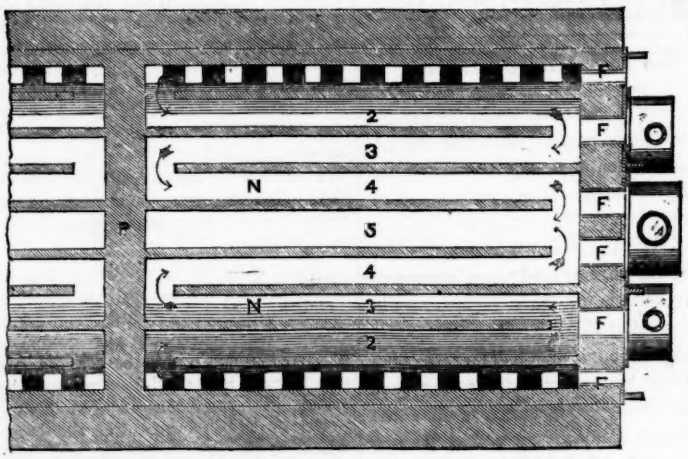


Fig. 4.—PLAN AT TOP OF UPPER RETORT. Scale 1-40th size.

on the opposite side, and passes along the middle flue, No. 5, into the main flue, M, as shown in the longitudinal section, fig. 5. By this arrangement the heat passes over 50 feet length of surface of retort from the time it leaves the furnace until it reaches the main flue.

Fig. 5 is a longitudinal section through the upper retort, K, showing the opening into the main flue, M, and the damper, O, by which the draught is regulated. In this figure the position of the cross arches, L, that carry the large retort, is shown, covering the joints in the bottom of the retort; also the centre wall, P, which divides the two furnaces and flues, and carries the main flue.

these retorts in 1844, and they continue in regular work now, and are in good condition; the cost of repairs of the retorts, ovens, and furnaces during the eight years they have worked, has not exceeded 20s. per annum for each set.

The writer accounts for the durability and economy of retorts constructed on this plan, firstly, by their being composed of a great number of pieces, instead of only one; so that when their temperature is altered, either by the carelessness of the stokers, or in letting down the heat to throw the retort out of work, each joint opens a little, equal to the contraction of a 9-inch brick, and prevents any portion of the retort cracking. In the same way, in getting up the

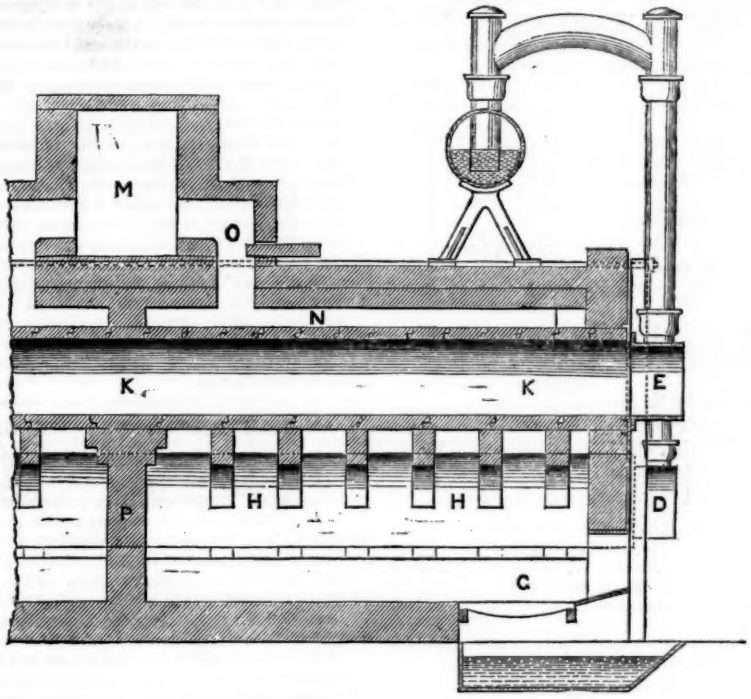


Fig. 5.—Longitudinal Section. Scale 1-40th size.

Fig. 6 is a plan of the lower retorts, showing the two furnaces, G G, with the centre division wall, P, the side flues, I I, and the floor of the lower retorts, H H.

It will be seen by the plans, figs. 4 and 6, that the sight holes, F F, are so arranged as to command a view of the whole longitudinal and side flues, by which means the condition of the retorts may at all times be observed, and any defects detected.

With regard to the durability, the writer may observe that 12 sets of these retorts were put up by him in 1842, and worked constantly, with the exception of short periods, up to 1849, when they were taken down for the alteration of the works, and they were found then in good condition, and were fit for working several years longer with slight repairs. The writer also put up 12 sets of

heat (which is a time when a great number of clay retorts made in one piece are destroyed), if one portion of the retort becomes heated more than another, the joints accommodate the expansion; or if the brickwork is in a very green state, and the expansion from the moisture is great, the screws of the tension rods may be eased, which will allow the whole mass of brickwork to swell, but as soon as the moisture is expelled it will sink back into its place, and be as perfect as when first built. When a set of these retorts is first put to work, either new or after being let down for any purpose, it leaks through the joints for about 24 hours, gradually stopping, and after that time, if the heat be good, it will have become quite sound, and permanently gas-tight, under a pressure equal to 10 or 12 inches head of water.

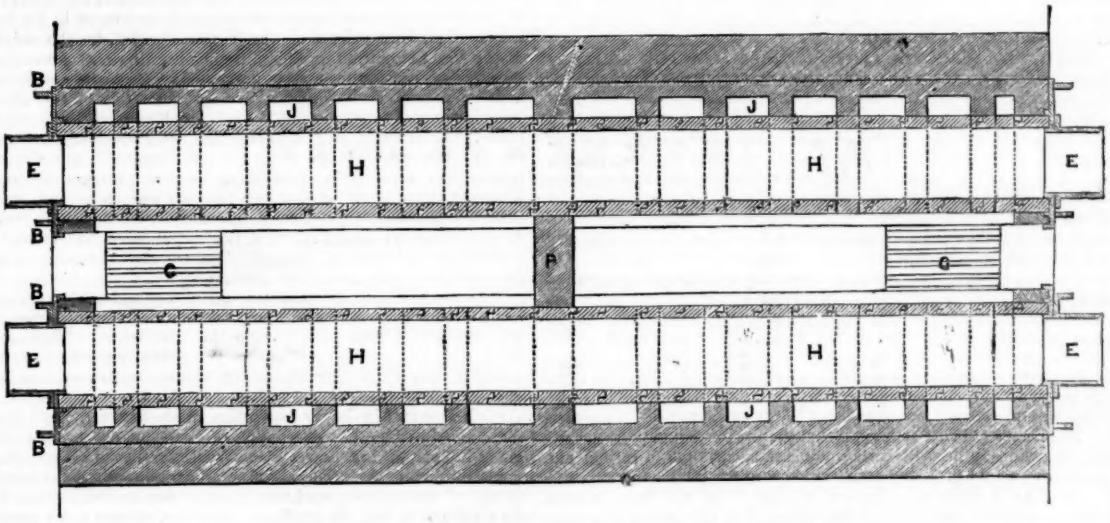


Fig. 6.—Plan at Centre of Lower Retorts. Scale 1-40th size.

From a sufficiently long experience, the writer has proved that brick retorts built upon this plan will wear for 10 years, with the outlay of 20s. per annum for repairs, and that iron retorts will not last more than 1½ year, under the most favourable circumstances. Then, to show their comparative economy, take a number, say 20 sets or beds of iron retorts, and 20 beds of brick retorts, each bed being capable of making 20,000 cubic feet of gas in 24 hours; and, to make the calculations as correct as possible, let the cost and repairs of each be estimated, and the quantity of gas they will make, during a period of 10 years, in order to ascertain the cost of the gas produced from each plan per 10,000 cubic feet.

First cost of 20 beds of iron retorts:—

Bricks, clay, and labour for arches				£367	0	0
100 cast-iron retorts, 18 cwt. each, 90 tons, at £6				540	0	0
Fire-bricks, shields, quarries, &c., for setting.....				150	0	0
Labour for setting, £3 each				60	0	0
				£1117	0	0
Cost of renewing 20 beds of iron retorts:—						
100 iron retorts, 90 tons, at £6	£540	0	0			
Bricks and clay	150	0	0			
Labour, taking down, and resetting	80	0	0			
	770	0	0			
Less by old burnt iron, 50 tons, at 25s. £62 10 0						
Less by one-third of bricks, which may be used again 50 0 0						
	112	10	0			
	£657	10	0			
This sum will be multiplied by 6½, the number of times they will be renewed in 10 years, which will give				4270	10	0
Making the total expense of iron retorts....				£5387	10	0
First cost of 20 beds of brick retorts:—						
Bricks, clay, and labour, for arches				£367	0	0
Iron for front plates and back-stays, 21 tons, at £6				126	0	0
Pattern and other bricks and clay for retorts				180	0	0
Labour for building retorts				110	0	0
				783	0	0
Cost of repairs for 10 years, at 20s. per bed per annum £100	0	0				
Less value of old front plates, &c., 20 tons, at 25s.	25	0	0			
				75	0	0
Making the total expense of brick retorts....				£858	0	0

Now, as the quantity of gas that each of the two descriptions of retorts is estimated to generate is the same for 10 years, namely, 1460 millions cubic feet, it follows that the gas from the cast-iron retorts costs 9d. per 10,000 cubic feet, and that from the fire-brick retorts 1¾d. per 10,000 cubic feet, for the item of retorts and ovens: showing an economy of 84 per cent. in the improved fire-brick retorts.

Mr. CLIFT exhibited specimens of the fire-bricks, showing the mode of jointing them to prevent leakage of the gas.

Mr. CHELLINGWORTH inquired whether a defect in a brick retort could be repaired, such as a bad joint? When an iron retort became broken it could not be repaired, and was all lost, and had to be pulled out; but it was a great advantage in the brick retorts if they could be readily repaired.

Mr. CLIFT replied that a defect could be easily repaired at any time, without stopping the working of the retorts; the surface of the retorts could be thoroughly examined through the different sight holes, and any defective joint detected by the appearance of a gas flame, and a single brick could be taken out of any part when required, and removed by proper tools through the sight holes, which were made large enough for a brick to pass, and another brick was then set in its place with fire-clay, without occasion to let down the heat of the retort. When a brick retort was pulled down, it was found that the carbon deposited from the gas filled up any crack or fracture, by the carbon adhering to the rough surface of the brick and collecting upon it, from the indestructible nature of the brick. But a crack in a cast-iron retort continued getting worse, and became constantly more open, on account of the surface of the iron perishing in the sides of the crack, which prevented it from getting closed up by a deposit of carbon, as in the brick retorts. When a cast iron retort was once cracked it was done for, and must be thrown away, requiring the whole oven to be opened out and rebuilt, and causing a serious delay to the work, as well as expense.

Mr. RAMSBOTTOM remarked that the greater equality in the rate of expansion by heat of carbon and fire-brick, than of carbon and cast iron, would probably assist in keeping the joints close.

Mr. CLIFT observed, that on pulling down the brick retorts, after seven years' working, it was found that the joints were completely blackened and filled with carbon half-way through, up to the fire-clay stopping in the centre groove, but the outer half of the joints showed no appearance of the carbon having passed the groove.

Mr. H. WRIGHT said he had lately had some gas ovens built on Mr. Clift's plan, instead of renewing the cast-iron retorts used previously, and they had been at work for some months very satisfactorily; there was no appearance of defect in getting up the heat or letting it down, and he considered that the plan was an important improvement.

Mr. CLIFT observed that the plan of constructing the retorts of double the usual length, with a mouth-piece at each end, he had only had in use for about a year, but he found it a decided improvement, and had since adopted it in all new works. The other retorts became scurfed up with a large accumulation of carbon, particularly at the back ends, where the scurf became several inches thick and very hard, and the retorts had to be stopped work and the heat let down, usually every eight months, for the purpose of clearing out this scurf, and getting it detached by the contraction in cooling. But in the long retorts, open at both ends, there was no back for the scurf to accumulate, and the current of air through the retort every time that both ends were open, caused the scurf to scale off, and it was much easier to detach, and consequently it was found that they would work much longer before requiring to be let down. Also the centre portion of the oven, which is the hottest part, and most valuable for making gas, was lost before by the blank ends of the retorts, but is now made available, as there is only a single brick wall dividing the flues, and by this means the heating surface and contents of the retorts are increased, without any increase in the size or expense. Another advantage is found in preventing the injury and shaking of the joints that was caused in drawing the coke from the retort, by the heavy rake being driven against the back of the retort.

THE CHEMISTRY OF GAS LIGHTING.

(*Continued from page* 374.)

Positively we are almost afraid to write upon the subject of coal tar, lest we render ourselves indictable for a nuisance; since, to such a length has the sanitary mania proceeded, that even the very name of coal tar seems redolent of prosecution and Board of Health investigations. Most certainly, we are either in the age of superlative humbug or superhuman wisdom. Time, perhaps, may decide, but, one way or other, the conclusion is inevitable. How our ancestors ever lived to reach the period of puberty will soon be one of the greatest puzzles of the day. All that we can say upon the subject is, that they ought not to have done so; and, therefore, if in spite of superior knowledge, such beings as Jenkins and Parr did actually reach a patriarchal age, it can prove nothing but their excessive obstinacy and repugnance to the finest principles of the healing art. They ought to have died *secundem artem* at exactly a tenth of their span. But their ignorance has descended down to a much later date, as not many years ago a very respectable navy physician (the late Dr. Trotter) published a volume, illustrated by numerous cases, to show that tar water was almost a specific "for every ill that flesh is heir to"; and, no farther back than the year 1833, Dr. Anthony Todd Thomson, of the London University, thus expressed himself in his "London Dispensatory," when speaking of tar:—"Tar is stimulant, diuretic, and sudorific, and externally detergent. In the solid state, made into pills, it has been beneficially used in ichthyosis, but it is more generally employed in the form of tar water. As an external application, it has been found beneficial in *porrigo scutulata*, foul ulcers, and some other cutaneous diseases." Alas! for human frailty, how would these eminent men stare to learn that this remedy of theirs is now regarded as the right hand of Death! The present epoch will probably be known in the future annals of medical science as the Nose-aic period, for the only part of the brain employed by the nuisance-hunting authorities is that connected with the olfactory nerve. Hopkins the witch-finder had not a more facile and decisive test than that of the sanitary commissioners. "She swims," says Hopkins; *ergo*, she must be burnt. She sinks: "Ah," says Hopkins, "we have made a mistake: she is drowned." "We don't like this smell," say the commissioners; *ergo*, it is unhealthy, and a prosecution begins. Hence it appears to us that the less we say about coal tar the better. To burn it, is a nuisance; to purify it, is a nuisance; to keep it, is a nuisance; to get rid of it, is a nuisance—in the eyes of the sanitary commissioners. Nevertheless, we shall be able to show that this very tar is a valuable commodity.

The composition of coal tar differs considerably according to the nature of the coal employed for its production, and the amount of heat used during the distillation. Thus cannel coals give both a larger quantity of tar, and also a more valuable tar, than bituminous or caking coals; and in those gas establishments where a low temperature is employed, the tar is better and in larger proportion than where a high heat is maintained during the distillation of the same coals. The differences in coal tar are, however, differences rather of degree than of constitution; for essentially all these tars contain the same substances. If any of the ordinary coal tars be subjected to distillation, it will be seen that at first the product is naphtha, almost quite pure and colourless; this is soon succeeded by a denser fluid, having a pale

yellow colour; after which a still heavier and more deeply coloured fluid makes its appearance; and this is followed by a dark viscid substance, which solidifies at the ordinary temperature of the air. These various products consist of several distinct bodies, having more or less volatility. They are not, however, capable of being separated by mere distillation, as they have for each other a kind of chemical affinity. We will, therefore, merely mention their names, and then proceed to describe the means usually practised for the separation of the most valuable of them.

The substances contained in coal tar are naphtha, or benzole; an oily matter less volatile than this, and resembling, if not identical with, eupione; naphthaline; paranaphthaline; copnomore, or an oil which smells like smoke; picamare, or an oil of an extremely hot and bitter taste; lastly, paraffine, in small quantity. There is also always a portion of ammonia present in coal tar.

By far the best mode of treating coal tar is, to distil it by means of what is called Coffey's still. This form of apparatus is not only the safest, but also the most economical. It consists essentially of a series of shallow trays, placed above each other, and having an arrangement by which a current of steam can sweep over and under the trays, thus heating and volatilising the benzole and eupione, but leaving the other ingredients, except a small quantity of naphthaline, untouched. The product of this distillation is, therefore, an impure benzole or rough naphtha, which, by a subsequent short process, may be rendered pure enough for the market; after parting with its benzole the tar becomes much thicker, and is then too frequently looked upon as worthless, or fit only for the preservation of wood-work. But, when freed from the water it contains, by standing some time in a warm situation, it will give, by distillation over an open fire, two substances of considerable value and large sale. The first of these is a heavy thick oil, applicable for the lubrication of large and powerful machinery; the other is paraffine—a material quite equal to spermaceti for the purpose of candle-making. For the other ingredients of coal tar—that is to say, the naphthaline, paranaphthaline, picamare, and copnomore—no use has yet been devised; consequently, in a marketable sense, they are worthless.

Nevertheless this seeming worthlessness may continue for a very short period. In proof of which we have only to adduce the recent discovery of M. Guinon, of Lyons. This gentleman has discovered that by acting on naphtha, and even upon rough coal tar itself, with strong nitric acid, the tar is speedily resolved into picric acid, a substance capable of communicating the most beautiful yellow tint to silk and woollen goods. This picric acid is now largely manufactured from coal tar both in Paris, Lyons, and other French towns; and we believe the manufacture of it has lately been established at Manchester. Picric acid is not a new substance, but has long been known under different appellations by chemists. It was at one time called the bitter principle of Welter, after which it received the names of nitro-picric acid and carbazotic acid, under which latter denomination it is generally described by English authors. Prior to the employment of coal tar, the materials used for its production were aloes and indigo, both of which, by the action of nitric acid, yield this substance. Almost any other animal or vegetable matter will, however, answer as well; and hence, no doubt, M. Guinon was led to his discovery. The yellow stain which nitric acid communicates to the skin by contact, arises from the production in this way of picric acid; and the colour cannot be removed by washing. Some idea may be formed of the value which coal tar assumes by being converted into picric acid, when we state that this acid is now purchased by the French dyers at the rate of 100 francs per kilo, or about 40s. per lb.

We now continue our remarks on the purification of naphtha.

Having, by means of Coffey's still or otherwise, obtained a quantity of rough naphtha, this may be purified as follows:—To a given portion of the naphtha add from 5 to 10 per cent. of oil of vitriol, and mix the whole well together for some time; when the mixture is complete, throw in about 5 per cent. of the peroxide of manganese, and repeat the stirring process again. When this is finished, it will be seen that the naphthaline and other impurities of the naphtha have combined with the oil of vitriol, and fallen to the bottom in the form of a thick tar, from which the supernatant naphtha must be carefully poured off and distilled into a clean vessel, when it will be found quite colourless and pure. The heavy oils obtained from the inspissated tar do not require much purification; they may be boiled for a few minutes with a weak alkaline ley, then suffered to cool and separate by the force of gravity. In this condition they may either be used alone, or, what is better, mixed with one-third of their weight of palm oil or lard, to give them consistence. Their peculiar odour is also very much diminished by this treatment.

In respect to paraffine, something yet remains to be done. This substance is of great interest, and, though contained in common coal tar only in minute quantity, is, nevertheless, pretty abundant in the tar from Boghead and other kinds of cannel coal. Some doubt seems to prevail as to whether there are not several kinds of paraffine; and practical experience has convinced us that the description given by Reichenbach, of the paraffine he obtained from beech-wood tar, is not at all applicable to the paraffine obtainable either from peat tar or coal tar, though these two latter seem identical. According to Reichenbach, paraffine is not in the least acted on by being boiled with the strongest acids; and, when fused and cooled, it solidifies without exhibiting the least sign of crystallisation. But the paraffine obtained from coal tar and from peat tar is charred and destroyed by boiling sulphuric acid; and, when fused and cooled, it crystallises in the most decisive and beautiful manner. Its tendency this way is, in fact, quite as prominent as that of spermaceti, which, more than any other substance, it resembles. Moreover, Reichenbach assures us that the paraffine he obtained from beech-wood tar could be volatilised and sublimed without decomposition; whereas we have found the paraffine of coal tar to undergo considerable loss during this process, and, moreover, to become changed in other respects. Either, therefore, the description of Reichenbach is incorrect, or more than one substance exists to which the name paraffine is now applied.

We have stated that, towards the end of the distillation of coal tar, a viscid oily matter makes it appearance, which solidifies at common temperatures. From Boghead coal tar this product is not trifling; and, if it be exposed for some time to the cold and then pressed, it will be found that an oily fluid separates, and leaves a kind of brown scaly mass behind. Now, when the residue is mixed with its own bulk of strong oil of vitriol, and kept at a temperature of 220° Fahr. for some hours, with repeated agitation, a clear colourless substance, in a fluid state, rises like water to the top, leaving a dark black-looking fluid below. On setting the whole aside to cool, the clear supernatant fluid will solidify, and may then be removed and remelted on water to purify it, whilst the oil of vitriol and the impurities of the paraffine constitute the dark fluid, and must be rejected.

As thus procured, coal-tar paraffine is a perfectly white inodorous body, fusing at a temperature of about 105° Fahrenheit, but continuing fluid at a much lower temperature. It crystallises on cooling in large feathery looking plates, not unlike the fern-leaf crystallisation of metallic antimony, which it also resembles in its disposition to radiate from a centre. When quite cold, it may readily be mistaken, even by a practised eye, for spermaceti. This substance seems admirably adapted for the fabrication of a standard photometrical candle. Its illuminating power is a little higher than that of spermaceti, and it burns with the most remarkable uniformity. We have at present a few candles made from the paraffine of peat, and have commenced a set of experiments with them, the results of which will make their appearance in due time. Meantime—in spite of sanitary commissioners, boards of health, nose-ologists, and quacks of all kinds—we trust that some practical attempts will be made to elucidate the treasures of coal tar, and convert that into a valuable commodity which, under the withering influence of false knowledge, is now proclaimed a pest and a nuisance.

(To be continued.)

GAS LIGHTING IN PARIS.

The Municipal Council of Paris, in a special meeting held on the 12th ult., resolved upon an important modification of the contracts now in force for the lighting of that city with gas, the details of which were given at length in our number for July, 1849. The following are the principal heads of the new contract:—

A new concession or monopoly for 32 years, commencing on Jan. 1, 1853, and ending on Dec. 31, 1884, is granted to the under-mentioned companies, viz.:—

The English Company, carried on under the firm of Manby, Margueritte, and Co.
The French Company, of Brunton, Pilté, and Co.
The Parisian Company, of Dubochet, Pauwels, and Co.
The Belleville Company, of Payn and Co.
The Company Lacarrière and Co.; and
The Western Company, of Charles Gosselin and Co.

The above constitute the whole of the gas companies within the city boundaries.

The authorities reserve to themselves the right of causing any of the mains to be altered or taken up whenever the public interest may require it, without any indemnity to the companies. They also similarly have the right of authorising trials of all new systems of lighting which may be invented.

The gas companies are to pay a rent of £8000 per annum for the permission to lay their pipes under the public highways.

Within six months from the date of the approval of the contract by the Government, the six companies are bound to amalgamate into one company.

The company is to replace the three gas works now existing in the interior of Paris, in the Avenue Trudaine, the Rue du Faubourg Poissonnière, and the Rue de la Tour du Temple, by one or several gas works to be established outside of the fortifications.

For the public lighting, which includes all the existing thoroughfares as well as the municipal and departmental establishments in the city of Paris, there are to be three series of batswing burners, the minimum dimensions of the flames of which are to be—

For the first series .. 2¼ in. wide by 1½ in. high.
„ second series 2⅔ in. wide by 1¼ in. high.
„ third series.. 3¾ in. wide by 1¾ in. high.

The price to be paid *per hour* for each light is fixed as follows, viz.:—

Lights of the first series ..... $\frac{5}{10}$ of a penny.
„ second „ ..... $\frac{12.5}{100}$ „
„ third „ ..... $\frac{4}{10}$ „

When gas is sold by measure to any of the establishments above mentioned, it is to be paid for at the rate of 4s. 6d. per 1000 feet.

The lighting is to be effected in 40 minutes at the utmost; and, in case of fogs or any unforeseen event, the duration of the public lighting may be extended as the circumstances may require.

The company is to maintain its plant and pipes in a perfect state of service, and to repair without delay all leaks which may be discovered in either pipes or cocks. The lanterns are to be cleaned daily, and the pillars washed once a month.

The company is bound to furnish gas to every one who shall have contracted for a three months' supply, provided payment is made monthly in advance. The supply may be either by measure, or at per light per hour, at the choice of the consumer. The meters are to be provided by the latter, and stamped after being tested by the authorities.

The price of gas by measure is thus fixed for the different years of the contract:—

1853	at 9s. 9d.	per 1000 feet.
1854	9 6	„
1855	9 3	„
1856	9 0	„
1857 to 1859....	8 9	„
1860 „ 1862....	8 6	„
1863 „ 1865....	8 3	„
1866 „ 1868....	8 0	„
1869 „ 1884....	7 10	„

The 20-hole argand burner, consuming 4¼ cubic feet of gas per hour, is to be paid for at the under-mentioned rates *per hour* up to Dec. 31, 1856:—

	From sunset to 10 o'clock.	From sunset to 11 and 12 o'clock.
1853	·615d.	·565d.
1854	·610	·560
1855	·605	·555
1856	·600	·550

The contract price for all other descriptions of burners is to be fixed by special agreement between the gas company and the consumers, and the same with *every* description of contract burners after Jan. 1, 1857.

The united capitals of the six amalgamated companies is stated to be 41 million francs, or about £1,640,000 sterling. The present quotations for the shares are—

The English Company	£100	paid,	sells for	£272.
The French Company	20	„	„	48
The Parisian Company	40	„	„	58
Lacarrière's Company	80	„	„	168
The Belleville Company	20	„	„	55
The Western Company	20	„	„	32

We learn from a late number of the "*Industrie*" that the ratification of the new contract by the Government encounters some difficulties, but it is not considered probable that its conditions will be materially altered.

Correspondence.

MR. LEWIS THOMPSON ON THE ILLUMINATING POWER OF GAS IN THE METROPOLIS.

Sir,—In presenting you with an exact copy of my photometrical table for the past month, I am, as usual, compelled to offer a few remarks upon the nature of the illuminating gases supplied during this period to the City of London by the different gas companies. A day may perhaps arrive when this labour will be spared me, by the great purity and satisfactory character of the whole of these gases. There is, however, I fear, no more prospect of this pleasing result at present than there is of the advent of the Greek Kalends, or the payment of the National Debt. I have, therefore, laid in another stock of pens and ink.

In my last I had occasion to animadvert severely upon the foulness of the gas supplied by the Great Central Gas Consumers' Company: this pestiferous and unwholesome nuisance still continues with unabated malignancy. In other respects, as the diary table will show, the Central gas has not been so bad.

But why is that poisonous and baneful substance, carbonic acid, allowed to remain in the Central gas, when a few bushels of lime would remove it? "Thereby hangs a tale." A friend of mine, who sometimes approaches the "Board," gave me a little information a few days since. It appears that "a director" of more than ordinary sagacity lately proposed to "cut off *that man* in Pancras-lane." This of course, when I first heard it, merely excited my risibility at the wisdom of the proposer. Upon reflection, however, I perceive that the expression admits of a very serious construction when conjoined to the deadly nature of the impure gas. Is it possible that this director meant to say, "Poison *that man* in Pancras-lane"? for this is the general meaning of the expression "cut off." I begin to be alarmed, and, therefore, suggest to the rest of the directors, that in cutting me off, they will also "cut off" the rest of their consumers. Or rather, I may say, that these will be "cut off" before me, for I am on my guard, and never allow the Central gas to be burnt in my establishment, except when all the doors and windows are open; and, in addition to this precaution, I sprinkle my room with a solution of ammonia, so as to absorb and neutralise the carbonic acid; moreover, the directors would find it much easier to purify their gas, than to poison me, or even "cut me off" in any other sense. As I have before stated, a few bushels of lime would do this, and when done I shall have very great pleasure in bearing testimony to the fact. But, whilst this poisonous carbonic acid remains, what can I do but use the precautions which I at present employ?

Leaving this disagreeable subject, I have a short question to ask. Has any one seen or heard of the quarterly report of the Chemical Referee, which was due a month since, in regard to the Central gas? I wish much to see it, and will feel obliged by a copy.

I have some hopes that, in a short time, I shall be able to furnish a report upon the gas manufactured at the Brick-lane station of the Chartered Gas Company, as well as the present report which relates to the Curtain-road station. This month I have been able to make 13 observations upon the Brick-lane gas, and am far from satisfied with the result, either as regards purity or illuminating power. In fairness, I ought to state that extensive alterations are said to be going on in the purifying department of that station, consequently some allowance must be made. We shall see, however, very shortly how far this forms a valid excuse for the present defects. In the gas of the Curtain-road station, carbonic acid has existed on seven days during the past month, and in the City gas for sixteen days during the same period. In both cases the quantity has, however, been very trivial; but it is not on this account, excusable. The less the carbonic acid, the less the excuse for its presence. I will shortly offer a prize to be given to the engineer of that gas company which supplies me for one entire month with pure gas.

And now I have something in the way of a narrative to relate About six weeks ago, I was delighted to perceive, by certain "tubular" indications, that another testing establishment was about to be opened in close proximity to my own. Never doubting the sincerity of the new comer, I gave him full credit by anticipation for truthfulness and honesty, and made him heartily welcome to the gas world. Alas! I was sadly deceived. The new comer was an old friend with a new face. The old friend was the Great Central Gas Consumers' Company; the new face (how could I guess such a thing?) was the proprietor of an imaginary billiard-room! I write this with regret and sorrow, for it sincerely grieves me to see men (I will not say gentlemen) conduct themselves in a manner so much beneath the proper dignity of their position. Was it becoming? was it honest? was it even prudent, to attempt to procure a supply of a rival company's gas by falsehood? and was it not something worse than this to prevail upon a tradesman to become the tool of so disgraceful a scheme? Had the Great Central Company applied to me for assistance, I would have done everything in my power to procure a supply of gas honestly and fairly, as I procured it for myself. But how can I join in a project which begins in untruth, and can end only in disgrace? Yet, what I can do, I will still do; and, therefore, offer the Great Central Gas Consumers' Company the use of my apartment for two hours every day, during which they may test the different gases, either with my chemicals and apparatus, or with their own brought hither for the purpose. All I ask is, that as they will have free access to my diary, so in courtesy they will permit me to inspect theirs. Even this, however, I am willing to forego, if a sufficient reason is assigned.*

* We have permission to publish the following significant correspondence on the same subject, which has passed between the Great Central Gas Consumers' Company and a consumer of the gas of the City of London Gas Company.

"TO THE DIRECTORS OF THE GREAT CENTRAL GAS CONSUMERS' COMPANY.

"Gentlemen,—For some days past I have remarked that preparations are being made for laying on the gases of the three City gas companies to a house in the Poultry; and I am informed that it is done, by your direction, for the purpose of testing the quality of the different gases.

"The works seem now to be suspended, so far as a supply from the City of London Gas Company is concerned; and I beg leave, in consequence, to offer you a gratuitous supply of that company's gas, through my meter and service, to which a connection may be readily made from the present termination of your pipe. The only stipulations to which I require your assent, in return, are—first, that you will repair any damage done in connecting your service with my fittings; and, secondly, that you will publish in the JOURNAL OF GAS LIGHTING, monthly, the result of all your experiments, authenticated by some respectable and competent party."

(REPLY.)

"*Great Central Gas Consumers' Company,*
28, Coleman-street, London, Aug. 2, 1852.

"Sir,—The City of London Gas Company have not offered any impediment that I have heard of, to our being supplied with their gas for our experiments; the directors will, therefore, not have occasion at present, at any rate, to take into consideration your proposal to us to furnish information for the use of the Gas Journal.

"I am, sir, your obedient servant,
"R. M. MASSEY, Secretary."

The following is the monthly summary of my operations:—

	Specific gravity.	Illuminating power in standard candles.	Condensation by bromine.
Brick-lane Station of the Chartered Gas Company. Average of 13 observations	·402	11·4	3·6

General or Monthly Average of the Heating Power of the Gases supplied to the City of London by the Gas Companies mentioned, between the 10th of July and the 9th of August inclusive.

	Grains of Water evaporated by 1 cubic foot of Gas burnt at the rate of 10 cubic feet per hour.
City Company.....	2820
Chartered Company } Curtain-road Station	2755
Chartered Company } Brick-lane Station ..	2614
Central Company.....	2676

Daily Record of Observations upon the Gases mentioned below, the specific gravity being taken by means of an air pump and flask with a delicate balance, the condensation by bromine, and the illuminating power by a spermaceti candle, burning about 120 grains per hour, but always reduced to this gravity by calculation.

Date.	Central Company.			City Company.			Chartered Company.		
	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.	Specific Gravity.	Illuminating Power in Standard Candles.	Condensation.
Aug. 10	·400	12·3	4·	·408	13·	4·	·406	13·4	3·9
11	·402	12·2	3·7	·406	12·8	3·8	·405	13·4	3·9
12	·396	10·5	3·4	·416	12·1	3·5	·410	12·6	3·7
13	·390	12·6	3·8	·420	13·8	4·1	·407	13·3	4·
14	·410	12·8	3·9	·414	13·6	4·	·409	13·2	4·
16	·403	12·8	3·9	·422	14·4	4·2	·409	13·3	4·
17	·409	13·	4·1	·421	14·4	4·2	·410	13·8	4·
18	·411	13·	4·1	·421	14·7	4·2	·414	14·1	4·
19	·409	12·9	4·	·418	14·2	4·1	·409	13·8	4·
20	·398	12·6	3·8	·428	15·2	4·2	·415	14·8	4·1
21	·410	13·3	4·1	·418	14·3	4·1	·408	13·1	4·
23	·403	12·7	3·9	·432	15·5	4·6	·412	14·5	4·1
24	·404	12·5	3·9	·421	14·6	4·2	·408	13·4	4·
25	·409	13·	4·	·410	14·1	4·1	·398	13·1	3·9
26	·403	12·7	3·9	·416	14·1	4·1	·405	13·3	4·
27	·415	14·	4·2	·415	14·2	4·1	·410	13·7	4·
28	·410	13·1	4·1	·410	14·	4·	·407	13·2	4·
30	·405	13·	4·	·409	13·7	4·	·404	13·	3·8
31	·415	14·1	4·2	·412	14·8	4·2	·400	13·2	3·8
Sept. 1	·405	13·1	4·	·407	13·8	4·	·394	13·	3·8
2	·400	12·9	3·9	·420	13·9	4·1	·400	13·2	3·9
3	·397	11·1	3·7	·412	13·	4·	·389	10·9	3·7
4	·400	12·6	3·9	·418	13·1	4·	·394	12·3	3·8
6	·404	13·1	4·	·420	13·6	4·	·403	13·	4·
7	·400	12·9	4·	·421	13·9	4·1	·405	13·2	4·
8	·397	12·6	3·8	·417	13·5	4·	·400	12·7	3·8
9	·394	12·5	3·8	·415	13·5	4·	·404	13·1	4·
Average	·403	12·7	4·	·416	13·8	4·1	·404	13·2	3·9

THE SANITARY GAS QUESTION.

Sir,—You will oblige me by giving insertion to the accompanying copy of a letter, which I have addressed and forwarded to Mr. Charles Pearson. The subject is one second in importance to no question now before the gas-burning public; and I trust that Mr. Pearson will see the necessity of giving it his immediate attention.

Lewis Thompson.

7 A, Pancras-lane, Sept. 9, 1852.

To Charles Pearson, Esq., &c. &c.

"*Portia.* Far as that little gas light casts its beams,
So shines a good deed in a naughty world.
Nerissa. When the moon shone we did not see the gas light."
Merchant of Venice.

Sir,—I feel convinced that you will not only overlook the seeming abruptness of this address, but regard my communication as it ought to be regarded, viz., in the light of a compliment paid by one civic patriot to another.

You are, in every sense of the word, a public character, and, whatever others may say or think, I, at least, will not question the honesty of your motives. It suits my purpose to consider you as a pure, disinterested, and honest individual; and nothing but your own actions shall ever induce me to abandon this favourable opinion. An excess of modesty may, perhaps, have hitherto prevented you from exposing to public gaze the many virtues which I believe you to possess; and thus your exertions have been unappreciated or misunderstood. The "spare hours" and "spare guineas" which you have so lavishly wasted in the service of your fellow-citizens are, on the same account, little thought of, or even regarded as apocryphal, by the very men whom you have so greatly benefited. Such a state of things as this cannot be any longer tolerated. If you are the genuine patriot that I wish you to be for my convenience, you deserve a public reward; if you are not, you shall certainly obtain a public exposure.

A pretty extensive acquaintance with men and things has made me either a powerful friend or a formidable opponent, according as I may find you worthy of the one or the other. For more than a quarter of a century I have been engaged in the pursuit of medical and scientific knowledge; for more than sixteen years I have been connected with the public press of Great Britain. The first gives me a power and right to form an opinion upon the subject now before me; the last confers upon me the means of expressing that opinion in the columns of many a broad sheet. Nor shall this gas-light affair be hidden under a bushel.

You have been taught, perhaps, to look upon me as an enemy to the Great Central Gas Consumers' Company; but dismiss this thought, and take the advice of Virgil—"*Nimium ne crede colori.*" I cannot afford to look down upon the said company with enmity: it is too far beneath me. I would as soon think of conceiving a personal enmity towards some particular moth or black beetle. Nothing of the kind, Mr. Pearson; the truths which I have told may be offensive, and no doubt are so in many quarters; but that I have any personal feeling or interest in the matter is altogether and utterly false. I court, whilst I defy, inquiry. You have lately manifested a surprising zeal in the cause of sanitary reform: and, if my information is not incorrect, this zeal has displayed itself in a solicitation to the Lord Mayor that a prosecution might be commenced against the City Gas Company for a nuisance which that company is supposed to create by the discharge of a few gallons of foul water into the crystal bosom of the transparent Thames. Now, although I am willing to admit that, in beginning, you must of necessity have begun somewhere, yet it seems to me that, for many reasons, this was, on your part, a very unhappy selection. In questions of this kind it is not enough to be beyond reproach; but, like Cæsar's wife, you must also be beyond suspicion.

Need I point out to you that, as self-acknowledged originator of the Great Central Gas Company, you ran a risk of having your motives questioned when you so strongly urged upon the Lord Mayor the necessity for prosecuting a rival gas company? Admitting that the transparency of the Thames was slightly interfered with, could no other offender have been found to commence operations upon than this rival gas company? I begin to doubt your discretion, though I am still willing to confide in your integrity. But, having begun, it is my intention that you shall go on; and, if it be criminal to contaminate water, let it also be criminal to contaminate air. Indeed, of the two, the latter is by far the greatest offence. In common with the rest of the citizens of London, I can drink or refuse at will the water of the Thames, but absolute necessity compels me to breathe the *unnecessarily* polluted atmosphere of the City. Do you mark, Mr. Pearson, that word "unnecessarily." The gas supplied to me by the Great Central Gas Consumers' Company is largely and unnecessarily contaminated with one of the most poisonous of all

the gases; that gas is carbonic acid, and I say that the Central gas is unnecessarily poisoned with this deadly substance. At the cost of one farthing for every 1000 cubic feet, the Central gas might be rendered pure; and I ask you, Mr. Pearson, whether it is reasonable that I and the citizens of London are to be poisoned that the shareholders of the Great Central Gas Consumers' Company may receive this wretched farthing for every 1000 cubic feet of their impure gas with which London is contaminated? Is this either reasonable, or just, or necessary; or is it to the establishment of so pestiferous a concern that you pretend to look back with such complacency and exultation? You are rather partial to metaphorical language, and speak vaguely of some "tree" which you planted fifteen years ago, and have watered and tended with paternal solicitude. If this gas-concern be the tree in question, all I can say is that it is a Upas, the poison-tree of the desert, and not the fragrant myrtle of civilisation. I speak feelingly on this matter. You, Mr. Pearson, are able to enumerate your exertions for your fellow-citizens, in spare "hours" and "spare guineas"; but mine admit of no such transitory computation. I must reckon by headaches, and attacks of dyspnœa, spasmodic asthma, and pulmonary congestion, induced by breathing an atmosphere most inexcusably and unnecessarily vitiated by carbonic acid. Nor am I alone in this unhappiness: the inmates of the most gorgeous shops; the dwellers in the most magnificent mansions; the toiling clerk; the sickly sempstress; the poor artisan, and the humble labourer, are all similarly afflicted. And who shall say where an evil of this kind stops? The cholera, we are told, is steadily making its way to our shores; and amongst a dense population, in whom the powers of life have been reduced by the debilitating effect of impure air, who dare calculate or predict the result? In cholera nothing is more remarkable than the black and carbonaceous character of the blood; and is not this exactly the character of blood which has been exposed to the action of carbonic acid? I know that it is, and can adduce the evidence of the greatest physiologists of every age and every nation to support my assertion. And let it not be forgotten that one farthing's worth of lime would remove this frightful source of disease from every 1000 cubic feet of the gas supplied by the Great Central Gas Consumers' Company.

Now, if it were even true—and remember that I totally and altogether deny it—but, if it were even true that the rest of the gas supplied to the City by the other companies was quite as bad as that of the Great Central Gas Company, still, sir, this would not affect your position in the least. When you pitched upon the City Company as an object of prosecution in respect to the Thames, you evidently made no allowance for the demerits of others—the guilt of many was not allowed to plead in extenuation of the victim. Let us proceed, then, upon your own system. I call upon you to prosecute, or to do your best to prosecute, the Great Central Gas Consumers' Company, for this worse than nuisance—a nuisance, Mr. Pearson, which depresses the vital powers, impedes the circulation, and prevents the proper oxidation of the blood. You cannot refuse me your assistance, for I thus publicly invite you to come with as many scientific and medical friends as you choose to bring. Come, I say, and see with your own eyes the foulness of the Central gas; come, and with your own lungs breathe the deadly vapours which it exhales; remain in my apartment but one hour whilst this gas is burnt, and then home to dinner "with what appetite you may"—a sparrow will then go as far as a turkey under other circumstances. You must accept my invitation for your own sake; you must join with me or do worse.

I return again to the subject of "your tree," beneath whose shadow you contemplate enjoying so much quiet repose. Now, permit me to suggest that this tree will vegetate none the worse for my assistance, and I shall have infinite pleasure in witnessing your enjoyment of its shade. I can recite "*Tityre, tu patulæ recubans sub tegmine fagi*," and we will receive and wear our civic honours beneath the same umbrageous foliage.

In conclusion, I would remark that I am not to be silenced in this matter by silence, nor deterred by threats. I have asserted, and I here repeat it, that the gas supplied by the Great Central Gas Consumers' Company contains, unnecessarily and inexcusably, a deadly poison; and until that poison be removed, I shall continue to agitate this question. I will appeal to the public press at large; I will appeal to the Board of Health; I will even carry my complaint before Parliament—if nothing short of this will enable me to effect my purpose and secure to the citizens of London properly purified coal gas. I am, sir, your obedient servant,

LEWIS THOMPSON.

7 A, *Pancras-lane, London, Sept.* 8, 1852.

GAS MAKING IN SCOTLAND.

SIR,—I have taken the liberty to send a copy of our Balance Sheet, that you may see how small concerns are carried on in Scotland, and that you may have some tangible *data* to guide you in estimating the perfection to which we have attained. It will, at least, be seen that gas can be made out of London—with a small consumption—at a large profit, and at a price which the old companies in London were not ashamed to charge their customers a very few years ago.

I think it would be better for gas managers in general, were there a greater amount of correspondence taking place amongst them, even were the pages of the JOURNAL to be made the medium; only, when objections are urged, or inquiries made, the answers should be given in a kindly spirit, and not in that would-be-witty-at-our-expense kind of way which, I am sorry to say, is sometimes practised by the writers in the JOURNAL.

ONE OF YOUR OLDEST READERS.

Balance Sheet for the Year ending May 15, 1852.

INCOME.

Received for gas sold—1,894,000 ft., at 7s. 11d.		£749	14	2	
,, meter rent, at 2s. each		22	0	2	
,, meters, coke, tar, and pipes, sold..		17	6	2	
					£789 0 6

EXPENDITURE.

Paid for Parrot coal—203 tons	£163	16	9	
,, furnace coal—87 tons	37	6	9	
,, lime	5	4	0	
,, retorts, bricks, and clay	11	15	0	
,, meters	35	3	9	
,, miscellaneous accounts	39	15	4	
,, public rates	16	18	4	
,, salaries	78	0	0	
,, wages on works and on streets	70	2	0	
				458 1 11
Net gain				£330 18 7

Gas sold per ton of coal carbonised .... 9365 cubic feet.

Register of New Patents.

FRANK CLARKE HILLS, of Deptford, in the county of Kent, manufacturing chemist, for "*Improvements in manufacturing and purifying certain gases, and in preparing certain substances for purifying the same.*" Patent dated Jan. 24, 1852.

My first improvement consists in a mode of obtaining gas for illumination from tar or other liquid hydro-carbons, and steam or the gases resulting from the decomposition of steam. For this purpose I provide a still, with a manhole door for cleaning out the residuum. About two feet of tar or other liquid hydro-carbon is kept in the still, and, as it distils over, more liquid is run into the still in a continuous stream. To produce the best effect, a fire should be kept up under the still, to keep the liquid in the still hot, and steam (or the gases resulting from its decomposition), preferably heated as high as possible by passing through red-hot pipes, or by any other convenient means, is passed into the liquid in the still. The steam or gases will carry off with it a portion of the hydro-carbon in vapour, the quantity of which may be regulated by the heat of the fire under the still. The steam and hydro-carbonaceous vapour pass from the still into a furnace or retort (preferably placed upright), filled with coke, and maintained at, or as nearly at a white heat as possible, whereby the steam and hydro-carbonaceous vapour will be, to a great extent, decomposed, and a large quantity of carburetted hydrogen and carbonic oxide will result, which may be mixed with coal gas obtained in the ordinary manner. The still will require to be occasionally cleaned out, to remove the pitch, &c., and incrustation. The gas may be freed from any carbonic acid which may be formed, by any of the ordinary means.

My second improvement is for the following methods of decomposing steam, or steam mixed with hydro-carbonaceous vapour:—I make an upright furnace or retort of any convenient size—say, 8 feet high by 18 inches wide—lined with fire bricks, and filled with coke or anthracite coal, or other similar carbon, which is kept nearly or quite white hot by a blast of hot air admitted at the bottom from an air-pump. At the top and bottom of the furnace is placed a pipe in the interior of another pipe: the top interior pipe is for conducting the air from the air-pump to the bottom of the furnace, to which it descends through the exterior pipe close to the furnace; the bottom interior pipe is for conducting the steam to be decomposed into the furnace. These pipes are placed inside the others, for the purpose of heating the air and steam to be employed—the heated air and gas being sucked out of the furnace through the exterior pipes. The action of the pump is as follows:—At the first stroke of the pump, air is forced through the top interior pipe into the bottom of the furnace, and, at the same time, gas is sucked out of the furnace into the other end of the pump through the top exterior pipe, thereby making the air pumped in very hot, by abstracting the heat from the gas pumped out, and, at the same time, cooling the gas. These pipes should be of at least double the contents of the air-pump, so that no hot gas reaches the pump. At the reverse stroke of the pump the air, which was forced into the furnace through the top interior pipe, is sucked out through the bottom exterior pipe, and, at the same time, the gas that was sucked out at the top of the furnace is forced back again into the furnace, bringing it again in contact with the hot carbon, for the purpose of decomposing any remaining steam and carbonic acid into hydrogen and carbonic oxide. At the second stroke of the pump the decomposed air which has been sucked out of the furnace is forced into the atmosphere, and, at the same time, fresh air is sucked into the other end of the pump, to be forced into the furnace, as it first, by the next stroke of the pump. During the stroke of the pump, by which the decomposed air is forced into the atmosphere, and fresh air is being sucked into the pump for a fresh blast, steam for making gas is admitted into the furnace in any desired quantity, by opening a cock or valve worked by the machinery which drives the pump. This steam is to be conducted through the bottom interior pipe, and will become heated very hot by abstracting the heat from the decomposed air which fills the exterior pipe; it will then pass into the highly heated carbon, and, by coming in contact therewith and passing through it, it will be decomposed, at the same time it will drive upwards, and thence into the hydraulic main, the gas

contained in the upper part of the retort. By this means each end of the pump becomes alternately the end for forcing the fresh air into the furnace; and proper valves for regulating all the several passages must be placed to effect the purpose, worked by any appropriate machinery, which, as it may be endlessly varied, it is needless to describe. When tar or other liquid hydro-carbon is to be used, as before described, to furnish gas, the steam may be heated in the way just mentioned, and may then be passed into the hot tar, previous to entering the furnace, to carry up with it the tar vapour, to be decomposed along with the steam by the incandescent carbon. Instead of working only one furnace or retort by the air-pump, any number of retorts may be worked simultaneously, by having the air-pump and pipes large enough for the heating and cooling processes, with smaller branch pipes to each retort. The capacity of the pump and retorts will, of course, depend entirely upon the quantity of steam and tar to be decomposed. Instead of drawing the air in and out of the furnace as described, a continuous blast may be kept up through the furnace, until the carbon is raised to a white heat; the blast is then to be suspended, the passage for the products of combustion closed, and steam—either alone or mixed with the vapour of tar or other hydro-carbon, or with a small quantity of atmospheric air (say four per cent.), and preferably heated as hot as possible—is to be admitted as long as the carbon in the furnace remains sufficiently hot to decompose it; a fresh blast of air is then to be admitted, as before, to make the carbon as hot as at first, when steam, or steam and hydro-carbonaceous vapour, is to be admitted as before. The furnaces, by this mode of operation, should be much larger than before described. Instead of only working one furnace, it will be better to work two or more furnaces, so that one may be heating by the blast of air from the pump, while steam is being decomposed in another. The waste of heat may be used for any desired purpose.

My third improvement consists in another method of decomposing tar or other liquid hydro-carbon. I cause the tar, &c., to drop from the top of a vertical retort (kept at a high heat) upon a stratum, or a succession of strata, of hot coke supported upon gratings in the retort in such a manner that the tar, &c., which is not decomposed may percolate through the strata of coke and fall into a well attached to the bottom of the retort, which is to be kept cool, and from whence the tar is to be pumped up to be used over again.

The hydrogen, &c., from the decomposition of steam, may be admitted into this retort at the bottom to combine with gas formed from the tar, &c.

Instead of vaporising the tar to decompose it, the gas containing the tar vapour, as it comes from the ordinary retorts, may be treated as follows:—One retort out of each bed of retorts (the hotter the better) is to be furnished with a false bottom of bars, placed an inch or two from the bottom. These bars should be placed a little apart, so as to form a grating to support the coke, with which the retort above the bars is to be nearly filled. The rich gas containing the tar vapour, being the first products from the distillation of the coals, is to be passed from the other retorts by means of pipes furnished with valves, &c., under the grating above described, where it may be mixed with the gases formed by the decomposition of steam, and both will then pass together between the bars, and then through the hot coke to the upper part of the retort, and thence to the hydraulic main. The decomposed steam unites with a part of the gaseous hydro-carbon, and more gas is produced.

My fourth improvement is for purifying gas for illumination, and consists in mixing with lime or magnesia, or both, when these substances are used as purifying agents, and used in dry-lime purifiers, a portion of sulphate of lime, or muriate of lime, which, when damped, will retain the consistence of a damp powder.

The proportion of the salts of lime to be added to the lime or magnesia is to be regulated by the quantity of ammonia and carbonic acid contained in the gas to be purified, care being taken not to add too much, so as to make the mixture clog or become impervious to the free passage of the gas.

The refuse purifying material will be valuable as a manure.

My fifth improvement consists of a method of burning carbonate of lime formed in purifying gas by lime, so that it may be re-used for the purification of gas. For this purpose I subject the waste lime from dry-lime purifiers, and which contains a large portion of carbonate of lime, to a sharp red heat in a reverberatory furnace constructed as follows:—The bed of the furnace is formed in two stages, the hinder one being higher than the fore one. These beds are composed of fire tiles or bricks; the fire is situated under the fore bed, and is fed from the side; and the flame and heated air, after circulating under the fore bed, pass off at the opposite side, and sweep first over the fore bed and then over the hinder bed, from whence they descend and pass under the hinder bed in their passage to the chimney. The carbonate of lime, &c., is first placed on the upper bed to dissipate any moisture it may contain, and to warm it, and is then discharged into the lower bed, where, being heated above and below to a sharp red heat, the carbonic acid is quickly dispelled. Carbonate of magnesia will, of course, part with its carbonic acid by this treatment more readily than lime, when it can be got cheap enough.

My sixth improvement is for methods of rendering fit for re-use, in purifying gas, the sub-sulphates and oxy-chlorides of iron, and the different oxides of iron capable of purifying gas, either mixed or unmixed with more porous materials, which, after having been so employed, are become inert. To re-use any of the oxides or the salts of iron named above, which, after taking sulphur from the gas, are capable of being renovated by atmospheric air, I employ the following method, which is an improvement upon that contained in my patent of Nov. 28, 1849, for renovating oxides of certain metals:—Supposing there are four or more purifiers, such as are used for dry lime, containing the said oxides, either granulated as hereinafter described, or mixed with more porous materials, such as charcoal or sawdust, I allow crude gas to pass through the material in one or more such purifiers until the material has become foul or inert; then, by means of an air-pump or by any other convenient mode, force into the purifiers, along with the gas to be purified, a current of atmospheric air, in the proportion of about four volumes of air to 100 volumes of gas, which proportion may be regulated by the use of meters, &c. The air mixed with the gas in its passage through the foul material will reoxidise the iron, which will immediately react upon the gas, and thus a simultaneous and continuous process of deoxidising and reoxidising the iron will be carried on, and the material will continue to purify the gas without the labour and expense of frequently taking it out of the purifier to renovate it, and without the loss of time that would take place even if it were renovated in the purifier by shutting off the gas, and admitting atmospheric air to it.

As these materials after long use have a tendency to become clogged or stopped up by the deposition of sulphur, &c., so as to render it difficult for the gas to pass through them, I employ the following means to keep them open, so as to defer as long as possible the labour and expense of taking them out of the purifiers:—I make a frame to fit the interior of the purifier, with triangular notches on its upper surface to receive a series of triangular bars which are placed therein, with their flat sides uppermost, forming a false bottom or grating on which the material is to be placed. The frame is supported upon arms, eccentrics, or in any other suitable way, so as to admit of its being raised or lowered. Above the moveable false bottom are one or more ranges of thin flat wrought-iron bars, placed edgewise two or three inches apart across the purifier, so as partially to support the purifying material. When, from continued action, the materials have become somewhat clogged, the false bottom is to be lowered a little, and with it will descend the lower portion of the materials; but the upper portion, being partially sustained by the parallel bars, will not settle to the same extent, and thus the mass becomes loosened and broken up, and again rendered easily permeable to the gas.

When the said oxides are no longer capable of being readily renovated by air, and are become useless for purifying gas, they may be treated in the following way, whereby they will be made again available for the purpose of purification:—The sulphur and other impurities are to be burned off or got rid of in any convenient way, and the remaining oxides of iron are to be mixed with soda or potash, or either of their carbonates, or with nitrate of soda or potash, in a strong solution. Two parts of oxide and one of caustic soda answer well. This mixture is then to be made nearly red hot in a furnace, or in any convenient way, and is afterwards to be used for the purpose of purifying gas from cyanogen. I prefer placing this mixture in the first purifier, through which the gas passes from the condenser; to obtain the largest amount of cyanogen, which combines with the alkali and iron, it is best to allow the mixture to remain in the said purifier until it will take up no more cyanogen. It is then to be taken out of the purifier, and the cyanogen compounds may be washed out for use.

Instead of burning or heating the spent oxides with the alkalies, such alkalies, or preferably their carbonates, may be mixed with fresh oxides or the soluble parts of iron, to render them fit for purifying gas from cyanogen; this mixture is then to be placed in a purifier, and when it ceases to take up cyanogen and sulphur, it is to be taken out for renovation, and be made damp by adding a solution of the said alkalies or their carbonates as soon as possible after it is taken out of the purifiers. After renovation, the mixture is to be again put into the purifier to take up more cyanogen; and this process may be repeated until the material can no longer be profitably used, after which the compounds of cyanogen may be washed out for use.

Another method of rendering the spent oxides, which will no longer profitably purify gas, and which have not been mixed with alkalies, fit for re-use, is to wash them with a weak solution of soda or potash, or, preferably, the carbonates of soda or potash, to combine with the cyanogen which has been taken from the gas by the material, so as to obtain the cyanogen compounds for use. The sulphur is then to be burned off from the oxides, or got rid of in any convenient way, and the oxide will be fit for re-use as before described.

Instead of mixing any material, such as sawdust, breeze, &c., with the said oxides, &c., I prefer to granulate them, so that the gas may easily pass through them; and, being unmixed with other bulky materials, a much larger quantity of gas can be purified in the same space, and the sulphur may also be more easily obtained from them. Some of the oxides may be granulated by mixing them with water into a sort of clayey or doughy consistence, then pressing it into thin cakes, which, after drying in the sun or at a moderate heat, are to be broken up to the required size: the dust may be separated by sieves, and mixed up again.

The oxides may also be made granular by putting them in powder, with a little water, into a stamping press, which, by percussion, will make them into a solid state. They may then be broken up as desired.

The oxides, which are burned or heated with the alkalies, may be made granular in the furnace by the action of the heat. The processes hereinbefore described for the purification of gas are preferably carried on in dry-lime purifiers; but they may also be used in wet-lime purifiers by mixing the materials with water.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that what I claim is—

1. The method, as described, of obtaining gas by carrying up by means of steam, or the gases resulting from the decomposition of steam assisted by heat, the vapour of tar or other hydro-carbons into highly heated retorts, filled with coke or other such carbon to be decomposed.

2. I claim decomposing steam, or steam and hydro-carbonaceous vapour, by first heating coke or other carbon in furnaces or retorts to a great heat by means of air forced or drawn into the furnaces by any convenient methods, and then admitting steam, or steam and hydro-

carbon, to be decomposed; and which admission of air and steam, &c., is to be alternately employed.

3. I claim the mothod, as described, of treating or decomposing tar or other hydro-carbon, either alone or with the gases formed by the decomposition of steam, by causing the tar to drop upon red-hot coke as hereinbefore described.

4. I claim the decomposition of tarry vapour in ordinary gas by passing it (either mixed or unmixed with the gases resulting from the decomposition of steam) through red-hot carbon in the manner described.

5. I claim for purifying gas the use of a mixture of sulphate or muriate of lime, with either lime or magnesia, or both; but I do not claim either of these substances alone.

6. I claim the mode of burning carbonate of lime or of magnesia, as described, so that it may be re-used for purifying gas.

7. I claim the method of renovating hydrated oxides of iron, or any other oxides of iron that are capable of being renovated by atmospheric air (after they have become inert by taking sulphur from the gas), by admitting or forcing atmospheric air into the purifiers at the same time, and in conjunction with, the gas to be purified.

8. I claim the method described for loosening the said purifying material in the purifiers (when it becomes too solid or impervious to the gas) by means of a moveable false bottom in the purifyer, on which the material rests.

9. I claim rendering the spent oxides, which are no longer capable of being profitably renovated by air, fit for re-use to purify gas from cyanogen by first freeing them from sulphur and other impurities, and then using them in combination with the alkalies and salts mentioned, after heating them together to nearly a red heat.

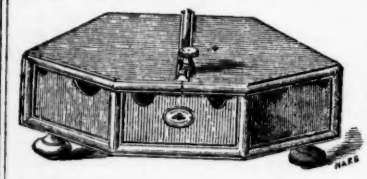
10. I claim, for the purpose of purifying gas, the using and re-using any oxides, sulphurets, or salts of iron, in combination with the alkalies before metioned, and adding a fresh portion of alkali to the said mixtures as often as they require renovation.

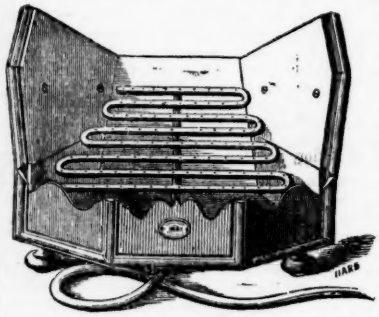
11. I claim obtaining cyanogen compounds from spent oxides, which have not been mixed with alkalies, and rendering the said oxides fit for re-use for purifying gas, by first washing them with a weak solution of soda or potash, or their carbonates, so as to obtain the compounds of cyanogen taken up by the material, and then burning off or otherwise removing the sulphur.

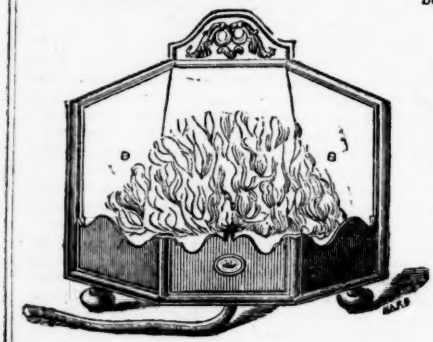
12. I claim the employment of oxides of iron in a granular state for the purification of gas.

Ebenezer Goddard, of Ipswich, gas engineer, for "*Improved gas stove.*" Registered Aug. 19, 1852.

This is an improvement upon the inventor's original asbestos gas stove, alluded to in the Journal of May last. The cases are of cast iron, with a lining of porcelain, so disposed as to throw the heat into the body of the room. Two forms are described: one in which the sides are hinged, so as to shut down and form a compact portable box of small dimensions; and in the other the sides are fixed. Fig. 1 shows the box closed, the burner, asbestos, and flexible tube, being packed inside. Fig. 2 shows this form of stove open. A handful of shreds of asbestos are sprinkled upon the gridiron burner, and, upon the gas being turned on and a light applied, the asbestos ignites and sparkles, forming a cheering substitute for an open fireplace. Fig. 3 represents the stove with fixed sides in actual operation. The consumption of gas is stated to be about seven cubic feet per hour.







William Edward Newton, of Chancery-lane, civil engineer, for "*Improvements in the manufacture of coke, and in the application of the gaseous products arising therefrom to useful purposes.*" (Being a communication.) Patent dated Feb. 23, 1852.

This invention consists in obtaining ammoniacal salts from the vapours evolving from ordinary coke-ovens during the process of coke-making. The products of combustion are conducted or drawn off by a blower into a flue, in which is placed a refrigerator, and they then pass into a condenser or chamber, where they come in contact with surfaces over which trickles a stream of some solution (such as sulphuric acid and water) capable of taking up the ammonia which is subsequently obtained from the solution by concentration. The non-condensible gases pass off from the condenser, and may be allowed to escape into the air, or be applied to other purposes.

Claim.—The application to coke-ovens of an apparatus by which the gaseous products evolved by the combustion of coal therein may, without interfering with the ordinary process of coking, be drawn off and conveyed to a receptacle or chamber, where they may be separated from each other, and combined with other chemical agents to form valuable products, or may be applied to other useful purposes.

Peter Armand Lecomte de Fontainemoreau, of South-street Finsbury, for "*Certain improvements in gas burners.*" (Being a communication). Patent dated Feb. 23, 1852.

Claims.—1. The construction of gas burners divided into compartments, and provided with internal tubes for regulating the supply and combustion of gas.

2. The supplying of air to gas burners through orifices in the chimney, the said burners being covered with a metal cloth; and the adaptation of tubes in lieu of the ordinary apertures for the passage of the gas, by which joint arrangements the vacillation of the flame is avoided.

Legal Intelligence.

COURT OF CHANCERY.

(Before the Lords Justices.)

THE ATTORNEY-GENERAL AND THE SHEFFIELD UNITED GAS LIGHT COMPANY *v.* THE SHEFFIELD GAS CONSUMERS' COMPANY.

THE APPEAL.

We announced briefly, in our last, the result of the appeal against Vice-Chancellor Turner's judgment in this case. The appeal was heard on Friday, August 6, in the Lords Justices' Court. The arguments being very lengthened, we cannot find space for an entire transcript: the following passages are, therefore, selected as the most important.

The counsel in the case were—For the plaintiffs, Mr. Rolt and Mr. Amphlett; for the defendants, Mr. Bethel and Mr. Daniel.

Mr. Rolt opened the appeal, and, as he proceeded,

Lord Cranworth observed: I do not see what is to prevent the owner of the adjoining land, *toties quoties*, breaking up the soil; but he would subject himself to the risk of being prosecuted for breaking through the gas pipes.

Lord Justice Bruce: Does this act [the United Gas Companies' Act], according to its true construction, give the plaintiffs a monopoly?

Mr. Rolt: No, my lord.

Mr. Bethell: They want to get that by the injunction.

Lord Justice Bruce: It does not seem to me that it would have been very unreasonable if it were so, because they are to lay out a large sum of money: they are made compellable to supply gas upon certain terms.

Mr. Rolt: It does not give them a monopoly, my lord; it does not prevent any other person going to Parliament.

Lord Cranworth: You say, before the passing of the act, no stranger had a right to do it, and the Legislature had delegated it to this particular company.

Mr. Rolt: Yes, my lord.

Lord Justice Bruce: As I understand it, they (the Consumers' Company) do not pretend that they had. If they do it at all, they will be liable to be indicted for a nuisance, if any one thinks it worth while to do so—to make it sufficiently serious. By digging a hole in a public highway they become liable to an indictment; but equally, of course, they would not be liable to an action, unless some accident happened to an owner of the soil. An owner of the soil may bring an action for a trespass on his soil; and in that way they would be liable to an action.

Lord Cranworth: And I think he might, at all times, remove any pipes that they choose to put in the ground.

In reply to some further observations of Mr. Rolt,

Lord Cranworth said: If you are right, that the soil of the street belongs to the owners of the adjoining houses, I do not see what is to prevent the owner of an adjoining house, after giving such notice or without such notice, either to make a hole or burrow underneath it.

Mr. Bethell: They could cut our pipes through *ad libitum*.

Mr. Rolt cited a number of cases, upon which

Lord Cranworth said: You only refer to them as showing the general opinion of the Legislature; and, without such acts of Parliament making this lawful, it never could have been contemplated by anybody that other persons could come and tear up the streets.

Lord Justice Bruce: The strength of your case is, that this must be a nuisance, because the proprietors of the land, whoever they may be, cannot legalise it on account of the easement; from the right that the Queen's subjects at large have to pass over the land and use it, it cannot be legalised. Then, if what they do must of necessity be a nuisance—supposing that to be a matter beyond question—then this point arises, whether it will be of a nature sufficiently serious, wide, and extensive, to render it proper for this jurisdiction to interfere.

Mr. Rolt: Then I will address myself to that in one moment, my lord; and I will say nothing more upon their want of authority.

Lord Justice Bruce: Assuming the soil—as has been already said—to be in the same position as the soil of a country road generally is, the conterminous proprietors may affect their private right in any way they may please: they may grant, as far as their private right is concerned, any right in the road, but they cannot do that as against any person who has the right of passing over the road. Therefore I said, according to your case, what is proposed to be done must be a nuisance, as I understand it. If a man digs a trench in a highway, that is a nuisance, whether any accident happens or not; and, whether he

leaves room for two carriages to pass each other or not, still I take it to be a nuisance according to my notion of such subjects. I apprehend that there may be a nuisance at law upon which a jury would convict, although not a case for an injunction in this court.

Lord CRANWORTH: If 99 persons out of 100 approve of it, and the one does not, that approval of the 99 will not weigh against the disapproval of the one.

Mr. BETHELL addressed the court on behalf of the defendants, when

Lord Justice BRUCE said: All the affidavits state that which all mankind must be aware of—they state that the company has proceeded to lay down gas pipes in the town, and they give descriptions of that which no person can be so ignorant as not to be aware of—that is, the contents of forty affidavits at least.

Mr. BETHELL continued his argument.

Lord Justice BRUCE: Is it to be inferred from the affidavits whether any number of persons can be represented as considerable, in any sense of the term, who object to those who are not connected with the parliamentary company?

Mr. BETHELL: I believe I answer correctly when I tell you that there is not an instance.

Lord Justice BRUCE: Because that, of course, cannot affect the mere legal nuisance: nuisance or no nuisance, it is just possible that that may be an ingredient affecting the discretion of the court, if it has a discretion upon the subject. The plaintiffs are bound to keep the streets in repair for a certain time—the streets that you are going to break up. We are both of opinion that there is nothing to be tried by a jury. It was quite understood what Lord Eldon was speaking of there was—whether he should interfere; it was in reference to Sir John Leach having refused to grant the injunction *ex parte;* and Lord Eldon said in such cases—that is, whether there should be an injunction granted before the hearing—you must be guided by the balance of convenience and inconvenience.

Lord CRANWORTH: There can be no doubt that tearing up the streets is an indictable offence.

Lord Justice BRUCE: There is a peculiarity in this case which I do not remember at this moment in any other: the plaintiffs are bound to keep the streets in repair. Mr. Daniel, let me know whether your deed fulfils this which is mentioned in this prospectus, "that the company was to consist of three-fourths of the shares, supply reserved for resident consumers." Does the deed carry that into effect?

Mr. DANIEL: Oh, yes.

Lord Justice BRUCE: The prospectus says so; and, as you know, promise and performance do not always follow.

The arguments having been concluded, their lordships then gave judgment.

Lord Justice KNIGHT BRUCE, who took precedence, said: The case divides itself into two portions—one relating to alleged public right, the other to alleged private right. To take the latter first. This bill is filed on the 14th of July now last. The company whose acts it seeks to prevent was notoriously proposed to be formed in the autumn of last year. It was then notorious that the company so proposed meant to do, if they could, the acts which are sought to be restrained by the motion; but, as I have said, this bill was not filed until July. Now, it has been, I think, taken for granted of late, more than the authorities warrant or principle would justify, that if there be notice of an objection it is equivalent, or nearly equivalent, to the institution of a suit; and that, whenever a suit shall be instituted, time for the purpose of equitable relief ought not to count for many purposes, at least against the plaintiff, after the time when notice of the objection was given. And it was said that notice of objection to this scheme or undertaking was given contemporaneously, that is, as early as the autumn of last year, and has been notoriously repeated and continued since. I do not, however, accede to the generality of the position. The matter must depend very much upon the circumstances of each particular case; and instances may well be conceived in which, after notice of an objection or opposition, the delay to institute a suit founded upon that may well count against the plaintiff. It strikes me that this is one of those cases; but more especially for this reason, that in the spring of the present year a bill was filed for the purpose of preventing what was intended. It was filed on the 17th of April. A motion was made for an injunction accordingly. The motion was opposed, and was refused with costs on the 24th of May. There was no appeal from the order, but that motion and the suit have since been abandoned; but the same matter is taken up afresh by the present suit, not instituted until the 14th of July. My opinion is, that upon the question of private right—without entering into any other considerations to which this part of the case is, perhaps, with propriety open—that furnishes sufficient ground for refusing the application. The question of public right remains; and upon the question of delay, though a stronger case is probably required to affect those who assert a public right—to affect them on the ground of delay—than in the case of a private right, yet I cannot agree that the delay, even in such a case, is to be without its effect. It is a circumstance to be attended to. Now, as far as the public right is concerned, there has been no suit whatever, except the present, instituted in July—more than half a year after the intention to do these acts had become notorious. The matter, however, does not rest there. The question of private right is brought forward as a matter affecting the community of a large provincial town—as a matter affecting the general convenience of life there. Now, I agree that motives are very often immaterial with reference to the manner of disposing of a suit. It has been said by an eminent judge, that, if you were to look into the motives of suitors, courts of justice would not sit above a month in the year—they would have nothing to do. Of course there are, in a vast majority of instances, motives for litigation which, if they could be looked into for any useful purpose, would render it impossible for a court of justice to interfere. That, however, is not the rule. Where, however, the public interest purports to be asserted, it is not wholly immaterial to look into the motives for which, or under which, the claim is brought forward; and in the present case, though the Attorney-General's name is used, it is impossible not to see that the suit has been brought forward without any reference whatever to the public good. Still, if the public advantage clearly requires the interposition of the court, that would probably not be very material. It is a fact, however, which, with others, is not entirely to be lost sight of. I have said that, upon the public question, the convenience and advantage of this large town are professed to be consulted by the information; but we find, as a matter of fact, that the majority of the town council is in favour of what the defendants are proposing to do; and upon a question of discretion it is impossible, with reference to a community of this description, not to look with some degree of respect or attention at what the governing body of the borough think upon the subject. It is said that many of the members of the town council are interested in favour of the defendants' undertaking. I dare say that it is so; but still they are members of the governing body, and the opinion of the majority is as I have said. It does not, however, rest there. It is plain upon the evidence that the opinions and wishes of a great preponderance in number of the inhabitants of this town are also in favour of what the defendants are doing. That does not legalise what is illegal; but it is a matter surely not to be disregarded, especially upon an interlocutory motion upon a question where the court is to exercise some discretion, as, in my opinion, though it is a question of public nuisance, it is bound to do so. That, however, again, might be immaterial, if that which were proposed to be done was certain, or highly probable, to be a public nuisance of a dangerous or mischievous or highly oppressive description. My opinion upon the evidence is, that it is not likely to be so; and, though I agree that what is proposed to be done will probably or certainly be in law a nuisance, it will not be a nuisance of a dangerous, a mischievous, or a highly oppressive character, or one importantly interfering with the comfort or convenience of life. For the reasons that I have mentioned, without entering into others which might probably no doubt be suggested, I am of opinion, as far as my judgment goes, that the present motion ought to be refused, without prejudice to any question, reserving the costs, and giving the plaintiffs leave, and, if necessary, the Attorney-General leave, to proceed at law, by indictment or action, as they may be advised.

Lord CRANWORTH: I have come to the same conclusion, and so entirely upon the same grounds, that, perhaps, it is hardly necessary I should say anything. My learned brother has pointed out that the case divides itself into two branches. Now, I am bound to say, in fairness, I think it does in form, but not in truth; for I cannot but come to the conclusion that the Attorney-General and the public here are a mere fiction—that the real parties concerned are only those that were parties to the first suit; and that the Attorney-General has been brought forward here, and induced to give his sanction, no doubt thinking he was giving it properly, to a matter in which really the interests which were intended to be protected were not those of the public, but those of the original plaintiffs, and now co-plaintiffs in this suit; and, looking at it as a question merely between the plaintiffs and the defendants, then I think there is abundant reason why there should not be an interlocutory injunction; because, although, as my learned brother pointed out, with my entire concurrence, to Mr. Rolt, we have no necessity for the intervention of a jury to tell us that digging up the public highway is a public offence or a public nuisance, yet I am very far from seeing my way to the conclusion that there is likely to be any private injury to the plaintiffs in the sense of there being an illegal act—an act of which the plaintiffs will have any right to complain. That will depend upon this: we must assume, upon this part of the argument, that what the defendants are proposing to do, and are about to do, is not open to the objection of its being a public offence—that they were going to do something which, by act of Parliament or otherwise, they were authorised to do, but without prejudice to any right of action that the plaintiffs might have against them. Suppose that to be the state of things, I am not prepared to say that anything that they are going to do so certainly must be an injury to the plaintiffs as to give them a right of action against the defendants for what they are proposing to do. It is very likely that, upon the speculation of those gentlemen who have made affidavits, it may be so difficult to lay down parallel lines of pipes as that the great probability is there would be some injury done; but I think that is not a case in which it would be discreet for this court to interfere interlocutorily by an injunction before the fact has been established, one way or another, by a trial. That seems to me to dispose of the question as far as the plaintiffs are concerned. But then the plaintiffs fall back upon what is the alleged injury to the public. Now, I have already said, in my opinion that is something that has been an afterthought, which constitutes no part of the original foundation of this litigation. I observe that the relator, as has been already pointed out, is only, in truth, the same plaintiff. The grievance complained of is, that in the progress of their works, and with a view to the establishment of this rival company, they must do that which will constitute in point of law a nuisance. Now, I dissent from Mr. Rolt's proposition in point of law, that to once establish an act to be a public nuisance, it is of course that there must be an injunction to restrain it. To what extent will that go? Every day there are nuisances in the streets of London. I take it that anybody who comes under my window and plays a barrel organ—or, if it were consistent with the dignity of the court, I might point out many other things that come about and collect crowds about your door—they are all nuisances. Did anybody ever hear of such a suggestion as that a party might file a bill to prevent a travelling mountebank going about and exhibiting before the doors of somebody, and who, if the man did not go, would have a right to prefer an indictment against him for a nuisance? It could not be said in that case that the party is entitled to an injunction. I have no doubt that what the present Lord Chancellor has said—qualified in the mode in which I have no doubt he meant it—is perfectly right. "Once establish that the setting up something permanently—that is to remain there for ever—a nuisance to me, establish that that is a nuisance," the Lord Chancellor has said, "I will

not hear the question argued whether it is more or less. If a party once does that which leads me to the inference that in point of fact he is constantly going to violate the law by inflicting a nuisance, this court will not tolerate that. This court will not let a person set up a nuisance, and say it shall remain there because it is a very little nuisance." If it is once a nuisance, and is there to continue, the Lord Chancellor said, that shall not be allowed. But how does that case apply here? It is true that the act done may be said to be a violation of the law. It is a violation of the law to dig up or interfere wherever her Majesty's subjects have a right of way; but what is suggested is, that this is so infinitesimally small that it is largely more than compensated, in point of convenience to those who will be practically injured by it, by the results which are to follow. Whether or not they are correct in that view of the case, it is not a matter that is necessary for me to speculate upon; but it is a satisfactory guide to the discretion of this court to say, that, looking at the case with regard to the question of convenience, I should think that probably the convenience resulting from it would preponderate over the inconvenience; and, that being so, I think it is not a case in which the court is bound to interfere, because it amounts in point of law to a nuisance. I concur, therefore, entirely in the conclusion which has been come to by Sir George Turner, qualified in the way which my learned brother has pointed out, that this motion should be refused; but reserving the costs, and with liberty to the parties to bring such action as they may be advised, in order to establish this right.

Lord Justice BRUCE: An action or indictment, and the refusal will be without prejudice to any question.

MR. DANIEL: And reserve the costs?

Lord Justice BRUCE: Yes.

Miscellaneous News.

VALUATIONS OF GAS AND WATER WORKS.

The operations of the Board of Health and its local branches have rendered arbitrations necessary, in some cases, for the purpose of determining the value of water works; and it is highly probable that the same course may be taken with several provincial gas works, under local improvement acts. The principles upon which valuations of this description are based become, therefore, of general interest to our readers; and, as they are fairly and temperately set forth in an able statement annexed to the report of Michael Scott, Esq., C.E., the engineer to the Swansea Local Board of Health, we are induced to give the document *in extenso*. It is in the form of a

STATEMENT

In the matter of the Arbitration between the SWANSEA LOCAL BOARD OF HEALTH *and the* SWANSEA WATER WORKS COMPANY, *by* MICHAEL SCOTT, Esq., C.E.

In the absence of information which I have failed to obtain, it is manifestly impossible for me to enter upon details respecting the condition of the existing works; and, for the same reason, I am precluded from discussing other, and not unimportant questions relating to this inquiry. I shall, therefore, confine myself chiefly to the elimination of the principles involved, and the exposition of general views, in the hope of shedding some light upon the real position of the matter, and the nature of the questions pending between the local board of health and the company, but, at the same time, not withholding any suggestions which may arise bearing upon the subject, and which ought to be submitted to the arbitrator for consideration.

At one of the earliest meetings of the water committee of the local board of health, which I had the honour to attend, I recommended that, in any arrangements which might be in contemplation, the existing water company should be dealt with, not only on fair, but on liberal terms; and it is with pleasure I bear testimony to the fact that that recommendation coincided with the views of the committee. I hold the same opinion still, and entirely repudiate the idea, which some entertain, that any water company's works should be purchased compulsorily at their value to the purchaser, without regard to their cost and to the benefits previously derived from them. For instance, in valuing water mains, I do not think it would be just to leave out of view the superior cost of pipes some years ago, although they could now be obtained at a much reduced price, arising from improvements in the manufacture; because this additional expenditure was no fault of the company, if no pipes of equal quality could be got for less money at the date when they were required.

Guided by these principles, I proceed with the investigation, and commence by inquiring what is the position of the company?

The Swansea Waterworks Company is incorporated under an act of Parliament passed in the year 1837, and I find that the preamble recites that—"Whereas the inhabitants of the town and borough of Swansea, in the parish of Swansea, in the county of Glamorgan, and the shipping frequenting the port thereof, are not at present well and conveniently supplied with water, and it would greatly contribute to the health, comfort, and convenience of the said inhabitants, and lessen the danger to lives and property in cases of accidents by fire, if a more wholesome and abundant supply of water were provided for the said town and borough: and whereas a sufficient supply of water for the purposes aforesaid may be obtained from divers springs and streams" (and so on, describing the various streams and ponds): "and whereas the several persons whose names are hereinafter mentioned have entered into a subscription, and agreed to raise the necessary sum, to make and maintain all the necessary works for supplying the inhabitants of the said town and borough of Swansea, and the shipping frequenting the port thereof, with good and wholesome water," &c. The act then proceeds to give the company power to make, maintain, and improve the works, for affording a sufficient supply of water to all the inhabitants within the limits of the act.

Here we have a solemn compact or bargain, concluded between the Legislature and the company, whereby, on the one side, very important powers and privileges are granted, on consideration that certain specific duties be performed by the company. These powers, guaranteed by the whole force of law, include compulsory purchase of lands, levying rates on the inhabitants, and receiving large profits from them; and they ought to constitute a monopoly, so long as the company's share of the compact is performed, but not necessarily for one day longer. If, then, it can be shown that the engagements of the company have hitherto been, and still continue to be, faithfully fulfilled, according to the agreement made with Parliament, and assuming that the stock of a water company was proved to be equal in every respect to the highest class of investments, it might be argued that any party wishing to purchase by compulsion their works, rights, and privileges, ought to compensate the company in full, and secure to the proprietors therein a revenue equal to that which they legitimately enjoyed at the date of transfer; special regard being had to the facts that the existence of the company's monopoly did not interfere with the public good, and that the revenue derived from it did not exceed a just and fair return for the capital invested. For Parliament did not grant the peculiar powers alluded to in order to enrich any individuals or aggregation of persons at the expense of the community, but in order that the inhabitants of Swansea should obtain an abundant supply of good and wholesome water, as the preamble of the act clearly proves.

Assuming, then, that these premises cannot reasonably be disputed, we have next to inquire—

1. Into the character of the investment;
2. Whether the existence of the company's monopoly interferes with the public good; and,
3. Whether the revenue derived from that monopoly is a fair and just return upon the capital invested.

I. As to the character of the investment.

The stock held in a water company evidently cannot be considered a first-class security. For example: it has a very different value from landed property, inasmuch as it possesses none of those social and political advantages conferred by the ownership of land, and so eagerly sought for in this country; nor is it comparable with it, simply viewed as a security for the principal sum, being subject to fluctuations in value, from which land is free. Waterworks stock might, with more propriety, be compared with house property, although even here there is an obvious difference between the two; for, whereas the amount of profit which the latter might yield is not limited, there is a limit appointed by the Legislature to the dividends of water companies; and there always has been, and must necessarily be, a practical limit, inasmuch as large profits realised by any such concern would inevitably induce competition. Once more, it may be said that waterworks stock is most strictly comparable with that held in canals, railways, or gas works; but here, again, there is a difference, although perhaps not so great, in the fact that the latter only minister to the convenience of the public, and consequently may come short of their engagements with more impunity than a water company, the proper performance of whose duty materially affects the very existence of the people.

Having thus stated that waterworks stock stands under house property in value, we may assume that, even when the sale is compulsory, no price beyond the ordinary number of years' purchase for which house property can be obtained would be either just or fair, except in cases where the company could prove that peculiar circumstances had compelled them to forego a proper return upon their capital in former years; or, in other words, that the company had expended capital in order to fulfil their duty to the public, and upon which a fair return might be expected at a future period, but which had not proved remunerative up to the date when their works were to be transferred.

For instance, the company may have laid mains to supply a few isolated dwellings at the further end of a new street or road, and at a period when the water rents from these houses would not yield a return of one per cent. on the cost of the pipeage. This may have been done chiefly for the convenience of the tenants of these dwellings, although also in anticipation of, and calculating upon, a fair return when the intermediate vacant ground should be built upon. I say, in such a case, showing a distinct anxiety on the part of a company to consult the public good in the first place, and the interest of the proprietors in the second, and indicating a strong desire to perform that which is not less than a duty, the arbitrator would not only be entitled, but bound, to take such expenditure into consideration. I am, however, informed that nothing of this kind has been done by the Swansea Waterworks Company; on the contrary, they have entirely neglected alike their duty and the interests of the inhabitants, for I find a very large portion of the town and borough without either pipes or water.

With regard to the second question, namely, whether the existence of the company's monopoly interferes with the public good, I shall be brief.

I apprehend that no one will question the fact that the public good is, and ought to be, paramount to any personal considerations; and I believe few will deny that an abundant supply of pure water is essential to the health and welfare of an urban population. Now, as the company has only given a supply, intermittent in character, deficient in quantity, and indifferent in quality, to a small part of the population within the limits of the act, and has afforded no supply whatever to the larger portion of the borough, it necessarily follows that the public good has already been, and is now being, sacrificed; and, as I shall hereafter prove that the company have not the means of giving a proper supply to the district from the sources at their command, it results that the existence of the monopoly enjoyed by the company is incompatible with the public good.

With regard to the next point, namely, whether or not the revenue is a fair return for the capital employed, we have first to determine the amount of capital; and, second, the amount of clear revenue. The capital is fixed by act of Parliament, and therefore cannot be

legally increased; because the Legislature, in effect, very properly says that an extension of capital being almost tantamount to the creation of a new concern, every such arrangement must be submitted to us in our judicial capacity before we authorise it in our legislative capacity. Now, assuming that the borrowing powers contained in the company's act have been exerted to the utmost, the total capital cannot exceed £15,000. By another clause in the act, I find that the company is precluded from holding any surplus lands; and, taking the description of the works from Mr. Clarke's report, who obtained his information, according to the said report, from the manager, and making due allowance for the superior cost of pipes, &c., at the time when the works were executed, as compared with the present, I estimate the cost to the company at the sum of £8000; and, adding to this, parliamentary expenses, compensations, law and incidental charges, which I assume at £3000, we have a total of £11,000.

It would, therefore, appear that the parliamentary capital was not exceeded, and that it would be most liberal to estimate the sum upon which a return was due at £15,000.

With regard to the revenue of the company, I have no certain information; but, assuming the sum collected at £1600, then we have to deduct working expenses, repairs, and charges, which cannot amount to less than £500, leaving £1100 per annum as clear income, or 7⅓ per cent. on a capital of £15,000.

One thing seems clear from the foregoing, that the company cannot urge the non-success of the undertaking, as a remunerative investment, as a reason for not extending the works to meet the growing wants of an increasing population; for surely 7⅓ per cent. must be considered a good return, when money can be borrowed at 4 per cent.; and additional proof of the soundness of this conclusion may be seen in the company's proposal to reduce their charges rather than permit the transfer of their works to the local board of health. In fact, it would appear, from statements made by the manager, that, in his opinion, a very small additional outlay would have provided an ample supply for the whole of the town.

Such are the more prominent features of the case; and, having discussed the position of the company generally, I propose now to consider in detail, in what particulars, and to what extent, they have failed to fulfil their engagements, and to see how far these differences affect the question of value; and I shall divide my observations under the heads of—The extent of the supply—The nature of the supply—The quantity of the supply, and—The quality of the supply.

First, as to the extent of the supply. When application was made to Parliament for an act, it was urged by the promoters that the borough of Swansea was very badly supplied with water, and that they were able and willing to provide a good supply, the words of their declaration being "abundant and wholesome." On the faith of these representations, ample powers were obtained; but what has the company done? Selected a portion of the borough which, from the density of the population and the very low level, could be served at a minimum cost, leaving the more elevated and more thinly inhabited parts without any supply whatever from the waterworks; no doubt because they were more expensive and more difficult to deal with. And not only this, but when the experience of fifteen years had proved either the unwillingness or incompetency of the company to supply the district alluded to, and when the local board of health proposed to take measures to remedy the evil, the company opposed their proceedings, although, at the same time, the manager admitted, and sought to prove, that "the town of Swansea, and the neighbourhood thereof respectively, are not at present sufficiently supplied with water"! If further proof be wanted of this fact, it may be discovered in the number of houses served by the company (1102) as compared with the total number, or 5452; leaving 4350 houses unsupplied. These figures speak for themselves; and though, no doubt, the difference is increased by the number of those who have not availed themselves of the supply they might have obtained, they place the company's neglect in a strong light, especially when viewed in connection with the fact that the necessary capital for extensions could readily be obtained, as the company prove, by admitting that the whole town could be served at rates of charge not much above two-thirds of those at present levied, and probably required, for the existing limited supply.

I grant that the works present few or no facilities for extension, and that new sources would have to be selected; but this is no excuse, inasmuch as there appears no reason to doubt that, if the company proved the rates specified in the proposal made to the water committee, Parliament would have granted powers to remedy an evil of such magnitude.

With respect to the nature of the supply, there can hardly be two opinions, for it is exceedingly defective, being not only intermittent, but miserably insufficient in pressure. It would not be difficult to show that many houses are frequently without water, and, the pressure being so limited, it is obvious that there can be no proper supply to the upper floors of the houses, even in the most depressed parts of the town. Upon this point we have the evidence of the turncock attached to the works, who stated that the water is cut off from the lower parts at eleven o'clock a.m., and restored between four and five o'clock p.m.; and, with regard to the head pressure obtainable from the reservoir, the same man declares that when the water is cut off from the lower part, it takes two hours before its appearance under pressure in the upper part, so that the supply, properly speaking, is not got till one o'clock; but, he adds, that when turned on again to the lower part of the town, the water runs down the hill in one hour.

These statements sufficiently indicate the impossibility of serving the upper portion of the town from the present works, and I find that the company are precluded, by act of Parliament, from erecting machinery within three-quarters of a mile of the reservoir.

The next point is the quantity supplied: and the facts of the service being intermittent, and pressure most deficient, prove at least that the water is not obtainable at all times, nor in desirable quantity; but we must take a wider view. The company's engagement was to supply the *borough*; and, I submit, this they cannot do in a sufficient manner, without the construction of additional and extensive works, because the necessary quantity is not available from those at present existing.

Not to enter upon more formal proofs at present, I shall assume the figures furnished by the manager of the waterworks, and to be found in Mr. Clarke's report, which give the supply available from the Bryn Mill Reservoir at 170 gallons per minute, in the dry months of August, September, and October; whereas the minimum supply required for the borough is about 425 gallons per minute, leaving a deficiency of 367,000 gallons per diem.

The third question is quality; and I would, on the threshold, observe that it is, to a great extent, a relative and not an absolute one. For instance, I do not think that a water company is bound to supply only such water as is absolutely pure, although I do maintain that all companies are bound to supply the best water which they can obtain in the district, and at reasonable cost; and assuming that such water is defective in point of purity, softness, or other requisite quality, and that known practicable means exist whereby it could be much improved, I further maintain that the company is bound to use such means, and endeavour to increase the salubrity of the supply. Now, what is the quality of the water supplied by the Swansea Waterworks, and what exertions has that company made to ensure the highest obtainable purity? I shall very shortly be in possession of an authoritative decision upon the first point; but, meantime, I would call attention to the fact that much of the drainage from the district of Sketty flows into the streams supplying the Bryn Mill Reservoir, and contaminates the water.

I am aware that there is a clause in the act which gives power to inflict a penalty upon any person who fouls the water; but the very existence of this clause is condemnatory of the company, because, whilst it shows the importance attached to purity by Parliament, it, at the same time leaves, no excuse for the neglect.

The company, I am informed, have not proceeded for penalties against any one, probably influenced by the consideration that other drains must be provided before the penalty could be recovered, the streams being the natural channels and outlets for the sewage of the district.

But more: not only is the water defiled by house sewage, but also by drainage from highly manured and cultivated lands and gardens, so that, during rainy weather, it is very muddy and impure. If it be replied, that, when the water is in the condition described, it is not admitted into the reservoir, but turned aside and permitted to run to waste, I answer that I have seen it, and others have seen it; and, if the occasions I can prove are rare exceptions, then it must follow that a large proportion of the whole water, so far as quantity is concerned, is run to waste, and consequently not available for the supply of the town, under the system pursued by the company. And, to afford some idea of the relative quantities flowing down some brooks in this district, during a given time, at periods when the water is discoloured, as compared with the quantities when it is clear, I will give an instance, obtained from several months' gaugings, and in which the proportion was as five to one, for water discoloured, compared to water clear.

But it may be contended that the inhabitants have not complained of impurity; and admitting, for argument's sake, that no complaints have been made, still it is a bad position, for the question is not, "Do the people complain?" but, "Is the water the best, and in the best condition, to be obtained in the district at a moderate cost?" Moreover, there is another point to be noticed in connection with this branch of our subject, namely, that a considerable proportion of the whole quantity of water flowing into the Bryn Mill Reservoir is comparatively pure, and tends to dilute the impure water; but a great part of the good water flows from springs within the Singleton estate, and is the property of Mr. Vivian, the company being expressly prevented, by their act of Parliament, from taking this water without Mr. Vivian's consent. Now, I do not assert that such consent would be refused, were it necessary for the public good; but, in valuing the Swansea Waterworks, no credit should be given for that which, although in the company's use, is the property of another party. Even if it could be proved, what I am far from admitting, that it was essential to employ impure water, I contend that the company were bound to construct reservoirs of sufficient capacity to allow the foreign matter to deposit, and also filters for the purification of the water; but not only has no such provision been made, but, by a clause in the act, the company are precluded from making any such works within three-quarters of a mile of the reservoir.

One word as to the supply provided for the extinction of fire: there being no pipes, and, of course, no water, in a large part of the town, I cannot see how this has been effected.

Before closing this imperfect statement, and although I am not in possession of much necessary information respecting the company's accounts, I think it my duty to submit some observations regarding the revenue, which will no doubt be an element in the calculation of value by the arbitrator; and to commence with the income:—It is sufficiently apparent that, to be legitimate, the income must be derived from the sources, in the proportions, and under the restrictions authorised and contained in the company's act; and it will, therefore, be important for the arbitrator to be assured of the following:—1. That the whole of the income has been derived from, and in return for, *a supply of water*. 2. That in no case has the charge for water exceeded the limits mentioned in the company's act, and that no larger sum be taken as income for any year or years than was earned in those years. 3. That all the matters which the company covenanted with Parliament to perform have been done.—If the company had fulfilled these conditions, then the amount received would have been legitimate income; but, having failed to do so in several important particulars, it follows that a very considerable deduction ought to be made from the receipts—such an amount, in fact, as would pay interest upon the capital which must be

expended to enable the company to fulfil the engagements named, not to mention increased working expenses. Such deductions being made, the next consideration is the cost of renewals, maintenance, and current working expenses.

With respect to the two former, the only fair mode of calculation is, to allow an annual sum sufficient to maintain the plant for ever in good working condition; for it is evident that, if the plant fall into decay and get worn out, the income would cease; and that cannot be considered clear revenue which does not allow first for necessary renewals. I would impress this the more upon the arbitrator, because I am informed that it is stated by the company that hitherto but little money has been expended on renewals or repairs; for just in proportion to the smallness of the amount which has heretofore been devoted to this object will be the magnitude of the sum which will hereafter be required.

No part of waterworks is everlasting: pipes, for example, have a certain life; and if, in the case of the Swansea works, that period has not yet arrived when repairs begin, on account of their yet limited and equal age, it is certain that, when they do commence to fail, the failure will be all but universal, and, should no provision have been previously made, the whole income will be absorbed for several years. In a word, the decay being certain, it must be met either by one large outlay, or numerous small ones; and it should be borne in mind that the imperfect nature of the supply hitherto afforded has contributed materially to keep down the expense of repairs; as, for instance, I am informed that the reservoir at Bryn Mill, though foul, has not been cleaned for twelve years, or in the case of the pipeage, which has never been subjected to one-half the pressure necessary to give an efficient supply; for, although each pipe may have been proved separately, the *joints* never could have been tested. Now, as it is not conceivable that the present state of things should continue, who can predict the result when the water enters these pipes for the first time under proper pressure?

The next point, namely, working expenses, should likewise be ascertained; and I submit that it is important to consider, not only what the works have hitherto cost under this head, but what they ought to cost. For example, it may happen that the works have been managed by gentlemen, who, being proprietors of stock in the company, have given their services gratuitously; but, nevertheless, a charge ought to be deducted from the income for management.

Then, again, from the defects in the supply, fewer men are no doubt at present employed than would be required under a more perfect system; and not only is it essential to keep these matters in view, but regard should be had to the necessity for a new station, for the erection of pumping machinery, &c. &c., before the supply could be made efficient, and thus an enormously increased charge would arise for working expenses. Having had some experience in these matters, I may add that a very usual allowance in such cases, for working expenses, is forty per cent. of the total receipts.

Finally, a company unable to supply one-half of the existing population can, of course, have no claim on account of prospective advantages; and yet in cases of the transfer of waterworks, in which I have been engaged, where remuneration for prospective advantages could be, and was justly, demanded, and where the position of the parties, in respect of having fulfilled their engagements to the public, was such as to give them much superior claims to any that could in fairness be preferred on behalf of the Swansea Company, the awards made did not average above sixteen years' purchase, calculated on the clear revenue available for dividend, after paying all working expenses.

I am induced to quote one case which occurred recently, and was in many respects parallel to that in question, and which I can undertake to prove before the arbitrator. It is as follows:—Certain waterworks were sold during last month; the population of the town is about 32,000; the rental actually collected for last year was £2140; the working expenses were £500, leaving a surplus of £1640. The company demanded for their works, in the first instance, £28,000, or seventeen years' purchase; and they obtained £13,000, or eight years' purchase.

In conclusion, such is a brief exposition of the company's case, as it appears to me, and such the considerations which ought to be weighed in connection with it, *assuming that the sale of the concern was compulsory;* and it only remains that I should call attention to the important fact that, in effect, it is the purchase by the board which is compulsory, and not the sale by the company. I apprehend that is so obvious as not to require illustration; for, the sole object of the board being to afford the best possible supply to the borough at the lowest possible price, it is certainly not the interest of the board, as representatives of the consumers of water, to purchase the works of the company, it being perfectly clear that Swansea could be supplied at a cheaper rate from other sources. But the company, foreseeing that the introduction of an improved supply, by a rival body, would go far to extinguish their present profits, are naturally alarmed; and, feeling their inability to compete with the proposed new works, they prefer selling the concern, the purchase of which will entail upon the ratepayers an additional outlay to produce the desired result, viz., an abundant supply of pure water.

I think the company is perfectly justified in protecting the interests of the shareholders, who are certainly entitled to fair compensation; but it should not be forgotten that the non-fulfilment of engagements by the company has been the origin of the present crisis.

PROGRESS OF COOKING BY GAS.

On Thursday, the 27th ult., the ceremony of opening the City of London Soup Kitchen, which is formed on the principle of the Leicester-square Soup Kitchen, took place under the auspices of the Right Hon. the Lord Mayor and several members of the Common Council of the City of London.

The premises selected for the purpose are situate at Victoria-bridge, Holborn, but the locality will be better known when it is described as one of the ruinous buildings standing in the open space at the end of Farringdon-street, but which, however, has been admirably fitted up to answer the purpose not only of a temporary refuge for the destitute, but the more useful one of conveying information to the applicants for relief, whereby they may be enabled to maintain themselves, by taking situations as domestic servants of every grade.

The purpose which the institution is proposed to answer is primarily that of affording relief to those persons who are unable to obtain the necessaries of life, and whose only alternative must be starvation or the workhouse; secondly, that of instruction in the various branches of domestic employment; and, thirdly, that of a registry for servants out of employ, so as to enable them to obtain situations without the payment of the usual fee required at what are termed servants' registration offices. In addition to these advantages there are dormitories, lavatories, cooking utensils of every kind; and each department is so arranged as to afford, in a limited space, as much facility for the recipients of relief as it is possible to afford.

The lower part of the building has at the entrance a convenient lavatory—amply provided with basins, washing apparatus, and a large bath; and from this, again, the visitor passes into a large hall, with a number of elevated seats in the centre, surrounded by round tables and benches, intended for the accommodation of those who seek temporary relief. Across the upper end of the apartment is a strong railing, behind which are several very complete sets of gas-cooking apparatus. The first of these is provided with moveable gridirons, under which two or three single jets of gas perform, in less than half the time, the work of a strong fire. In the centre is a baking or roasting apparatus, capable of cooking several large joints of meat simultaneously, and also a place for heating water. The steam which is produced by these processes is conducted by pipes to large tin vessels standing upon a wooden frame, and are then made to pass around the joints which they contain, cooking them with greater expedition than the ordinary method. Behind these, again, are several coppers for the manufacture of soup, and these also are heated by gas; the small quantity consumed seems almost incredible when its effects are contemplated. There is also a baking apparatus, on a larger scale than the first, capable of cooking 100lb. of meat at once. Above these coppers, which are all fitted with brass cocks for the admission of hot and cold water at pleasure, is a steam generator, provided with a safety-valve, and heated by a small ring of gas jets placed beneath. This is sufficient to furnish hot water for the lavatories, cooking, and steaming. On the top of one of the ovens are several iron basins, filled with the volcanic *scoriæ* known as pumice-stone, which in a short time becomes incandescent from the heat below, and remains in a bright red state, without loss of substance or the emission of any gaseous matter whatever, thus facilitating in a great degree the work commenced by the gas jets, and being really an economic apparatus, by confining the heat, which would otherwise be radiated through the apartment.

The soup apparatus is capable of making 1000 gallons per diem, and there is a commensurate provision for the cooking of solid food.

The apparatus is the manufacture of Messrs. Smith and Phillips, of Snow-hill, and the whole of the cookery is under the care of M. Soyer.

Around the appartment is a large wooden gallery, which may be called the instruction department. In one portion of this is an ironing table, provided with the necessary utensils, for the purpose of instructing the women and girls in that necessary portion of domestic science, from the finest description of work down to the very coarsest. Adjoining this is a table laid out *en famille;* this, also, being considered, and justly so, no unimportant branch of knowledge. In another portion is a table prepared for a large party; every variety of glass likely to be required being properly placed, and every napkin being differently folded, so as to enable the ambitious neophyte to suit the taste of all mistresses. Beyond this is a small closet, with a window resembling those of an ordinary sized house; and this the men and women are both taught to clean, while the closet itself serves as a cover for the simple operation of polishing boots and shoes. To this succeeds a table, upon which are placed the utensils for cleaning plate, and on another table the instruments for cleaning lamps. On a level with the gallery are placed women's dormitories, containing 14 beds, and above these, in a lofty apartment, are the men's beds. There are at present only 22, but the room is intended for 40. The most scrupulous arrangements are made to secure perfect ventilation.

REPORT OF THE GREENOCK GAS COMMITTEE FOR THE YEAR ENDING JUNE 30, 1852.

The committee, in laying before the trustees the annual report of the revenue and expenditure of the works for the past year, will endeavour to do so as briefly as possible, having so lately submitted an interim report of their proceedings. They have the satisfaction to state that the vidimus formerly submitted has been fully borne out by the actual returns. The gross revenue, after deducting discounts and bad debts, amounts to £9964. 7s. 3d.; the ordinary expenditure, including interest, to £5194. 1s. 8½d., and the extraordinary expenditure to £691. 14s. 0½d., leaving a balance of £4078. 11s. 6d. The committee out of this sum have repaid £2500 of the money advanced by the town of Greenock, and recommend that £750 be paid to the Town Proper, and likewise £750 to the Water Trustees, as usual.

The balance, £78. 11s. 6d., being carried to the credit of the Contingent Fund, this fund now amounts to £1012. 12s. 6½d., and the sum due to the town of Greenock £24,000.

It will be observed in the statement of the extraordinary expenditure, that, in addition to the usual outlay for new meters and extension of mains and services, a new wash vessel has been procured at a cost of £131. 10s. 10d.; likewise, that the ground purchased from Henry T. Patten, Esq., has been paid for out of the profits of the present year.

In the ordinary expenditure the committee have no remark to

make, except that it bears a fair comparison with last year, the coals and interest being rather less, the former from reduction of price, and the latter from repayment of capital.

Contracts for coals have been entered into for a period of two years from this date, at a considerable reduction from last year's prices.

Meters have been supplied and services laid to 257 new consumers during the year. Main pipes have also been enlarged or extended in Union-street, Eldon-street, West Stewart-street, Ardgowan-street, Holmscroft-street, Watt-street, and Crawfurd-street.

The discount to meter and contract consumers amounts to £341. 11s. 8d., and the bad debts to £19. 9s. 6d.

From the increased consumpt of gas, the committee authorised the heightening of the retort house roof, so as to give more air to the men employed therein. The cost will be about £130 when finished, and will appear in next year's account.

Considerable difficulty having been experienced in getting quit of the coal tar, the committee authorised the manager to procure a distilling apparatus, at the cost of about £20.

In conclusion, the committee have the satisfaction of reporting that the gas works have now reached a period which is satisfactory. The price to the consumers is as low as that of any work in Scotland, in some cases lower, while the return for the capital employed is amply remunerative, leaving a surplus of upwards of £4700 to go to the benefit of the community. If the consumpt of gas continues to increase as it has hitherto done, and the coals remain at the same low figure, the reduction in price from 5s. 10d. to 5s., with the usual scale of discounts, will be amply made up.

The cash book and vouchers have been regularly examined by the committee, and found correct.

Gas is supplied by measure, the charge being 5s. per 1000 cubic feet; payable on Nov. 15, Jan. 15, and May 15, of each year, subject to the undernoted graduated scale of discounts, deducted from the payment in May, viz.:—

When the gas passing through any one meter per ann. amounts to

£ 1,	and is under £10	.....	2½ per cent., or	4s. 10½d.	p. 1000
10, „	„ 30	.....	5 „	4s. 9d.	„
30, „	„ 60	.....	7½ „	4s. 7½d.	„
60, „	„ 100	.....	10 „	4s. 6d.	„
100, „	„ 150	.....	15 „	4s. 3d.	„
150, and upwards,		.....	20 „	4s. 0d.	„

The total quantities of coal used and gas produced during the period over which the accounts extend were, 3278 tons of the former, and 35,114,300 cubic feet of the latter.

EXPENDITURE AND RECEIPTS OF THE GREENOCK GAS COMMITTEE FOR THE YEAR ENDING JUNE 30, 1852.

ORDINARY EXPENDITURE.

Paid for Parrot coals		£1903	7	4		
„ interest		1199	0	11		
„ wages		611	1	5		
„ salaries		330	0	0		
„ repairs to retort bench		287	1	3		
„ feu duties and taxes (ordinary)		197	4	4		
„ Ditto for gas to town clock and Infirmary		54	19	3		
„ Ditto for feu duty and interest on price of ground purchased from H. T. Patten, writer, for 3 yrs.		69	0	4		
„ Lime for purification		132	13	4		
„ Stationery and printing		55	1	2		
„ cartage of ashes		12	16	4		
„ repairs to houses and apparatus		128	8	11		
„ repairs to main and service pipes		60	2	8		
„ repairs to meters		103	1	8		
„ incidents		50	2	9½		
					5194	1 8½

EXTRAORDINARY EXPENDITURE.

Meiers, main and service pipes, &c. &c.					691	14 0½

APPROPRIATION OF PROFITS.

Town of Greenock		750	0	0		
Water Trustees		750	0	0		
Repayment of capital		2500	0	0		
Contingent fund		78	11	6		
					4078	11 6
					£9964	7 3

REVENUE.

From consumers by meter	£7490	18	2
„ consumers by contract	108	10	3
„ interest on meters	336	4	8
„ coal tar, coke, and ammoniacal liquor	574	18	7
„ harbour and town lamps	1449	8	8
„ bad debts recovered	4	6	11
	£9964	7	3

BALANCE SHEET OF THE GREENOCK GAS COMMITTEE, SHOWING THEIR ENGAGEMENTS AND ASSETS ON JUNE 30, 1852.

ENGAGEMENTS.

To town of Greenock	£24,000	0	0
„ the heirs of Crawford and M'Aulay	6	9	11
„ contingent fund	1,012	12	6½
„ deposits for gas	1	14	6
„ town of Greenock account current	750	0	0
„ Water Trustees	750	0	0
	£26,520	16	11½

ASSETS.

By Gas Works	£24,000	0	0
„ Bank of Scotland	627	19	3
„ deposits on meters	1	12	0
„ cash	11	16	6½
„ main and service pipes, stock on hand	631	2	1
„ harbour and street lamps	172	17	2
„ repairs to retort bench	40	2	10
„ gas meters	87	9	0
„ repairs to meters	70	17	2
„ gas burners	28	7	0
„ Parrot coals	322	8	6
„ coal tar, coke, and liquor	233	12	7
„ stationery and printing	4	0	0
„ repairs to houses, carried forward to next year	100	7	4
„ tar-boiling apparatus, new account, transferred to next year	18	19	2
„ revenue per meter consumers, new account	8	8	8
„ revenue per sales, ledger new account, amount outstanding for tar, pipes, and sundries	150	17	8
	£26,520	16	11½

OPORTO.—The Municipal Chamber of Oporto has published conditions for lighting this city with gas, and is prepared to receive proposals up to the 17th of October for carrying them into effect.

LIVERPOOL UNITED GAS COMPANY.—The half-yearly ordinary meeting of this company was held on Tuesday week, at their offices in Newington. The accounts showed that the net profits for the year are £46,118. 16s. 11d., being an increase over the net profits of the year ending on the 30th of June, 1850, of £1084. 3s. 1d. The proprietors, at their meeting in February last, directed a dividend to be paid for the half-year ending on the 31st of December, 1851, at the rate of £5 per £100 share. This absorbed the sum of £22,521. 5s. They recommended that a dividend for the half-year ending the 30th of June last be declared of £5 per £100; £1. 5s. per £25 share on all shares paid up on the 30th of June, 1851; and 2s. 6d. per £25 share in respect of which an instalment of £2. 10s. has been paid.

SANITARY PROCEEDINGS IN THE CITY OF LONDON.—The Lord Mayor having refused to convict summarily upon the information lodged against the City of London Gas Company for causing a common nuisance, the matter has been carried to the sessions, and from thence removed into the Court of Queen's Bench.

SHEFFIELD CONSUMERS' GAS WORKS.—The first stone of these works was laid by the Mayor of Sheffield on the 30th ult.; and the event was afterwards celebrated by a public dinner at the Union Rooms, at which upwards of 300 persons were present.

VEGETABLE GAS.—Somebody has discovered the art of extracting gas from vegetables, and we may, therefore, expect to have our streets lighted with green peas in summer, potatoes in winter, onions in autumn, and during the remaining season we may look for our illumination to nice spring radishes.—*Punch.*

MINUTES OF EVIDENCE ON THE LIGHTING OF THE HOUSE OF COMMONS.

A Select Committee was appointed, by a resolution of the House of Commons of the 19th of March, 1852, "to consider the best means of improving the ventilation and lighting of the House and its appendages, and to report thereon at as early a period as may be." The committee appointed under this resolution was composed of Lord Robert Grosvenor (Chairman), Lord John Manners, Mr. Greene, Lord Ebrington, Mr. Ricardo, Sir D. Norreys, Mr. Cochrane, Mr. Deedes, Mr. H. Hope, Lord Palmerston, Mr. Bankes, Mr. Henry Drummond,

and, at a subsequent period, Mr. Henry Fitzroy, with Messrs. Robert Stephenson and Locke, the distinguished engineers, were added to the committee.

The following is the principal evidence given with regard to the lighting of the House.

MARCH 25, 1852.

David Boswell, Reid, Esq., M.D., examined by the CHAIRMAN.

216. How long have you had the lighting of the new House under your charge?—I cannot say that I have ever had it under my charge, since my plans for lighting were rejected, till the lamps introduced by Sir Charles Barry were, very recently, placed by Lord Seymour under my direction, though, as yet, I have only had the opportunity of preventing accidents and escapes of gas.

217. Is not the lighting of the House at this moment under your charge?—It is under my charge; the lighting has been three times in my hands, and three times taken out of them; now, the fourth time, it is put into my hands.

218. What are the alterations which you would suggest with regard to lighting the House; do you consider that the present lighting of the House interferes materially with its good ventilation?—Most certainly; especially also from the use of gas which produces such intense heat as the common gas does.

219. Will you state your reasons for thinking so?—My reasons are essentially these: they have reference to the light, to the effect of the direct heat radiated. I consider that the lights are not at such a distance as to permit with impunity the use of such strong burners; in the next place, those lights, instead of being ventilated in such a manner as would rapidly withdraw the steam and carbonic acid, have in reality a mass of metal-work connected with them, which becomes a condenser, and all the latent heat of the steam is given out to the metal; hence you have not only a mass of heat radiated, and direct visible light, but you have an accumulation from the latent heat of the steam condensed in the metallic apparatus. The tubes should have been very different, so as to have poured out the products of combustion without permitting them to deposit so much heat within the materials constantly exposed in the rooms. Then the position of the lights is not that which is desirable; ever since the first experiments made with respect to lighting the House under my direction in 1838, when I only had twenty-four hours for bringing in the gas and everything, I have endeavoured to advocate one uniform system, that is, to remove the lights and put them near the ceiling, or outside the window, or both; at the present moment we can scarcely get the men employed for the lighting out of the House, the number of attendants is so great, and they are sometimes till two o'clock working away at the lights, and all that time the gas is leaking in every direction from the lighting of the House; then that brings a mass of heat to a low level, independent of that which exists above when they are in full operation. I do not know how far the committee would like to hear further observations on this head.

220. The committee wish that you should give a full statement of your objections to the present system of lighting, and any proposal you may have for the purpose of remedying it?—The first point I should state with respect to the lighting is, that after a series of experiments made before fifty members of the Royal Society at Edinburgh, I endeavoured to show that even a small argand, at a distance of from three to ten feet from the brow, produces a radiating effect, which to some is intolerable, even within those distances, from the heat which the brow receives; and that, generally speaking, where large and powerful lamps are placed, the irritation of the nervous system dependent upon the application of heat to the brow, alters the feelings throughout the whole constitution; and it demands a double or treble ventilation compared with what would otherwise be necessary. I can give the most satisfactory proof that that is an accurate statement, if the House be tried on Wednesday, when there is no such light, and the effect then be compared with the effect at night, when there are lights. Then, believing that the radiations of the lamps may include many things besides heat and light, which are very objectionable, I have always endeavoured to try to produce an imitation of daylight for a public building; that is to say, a gentle diffusion of light throughout the building. As a substitute for two or three inches or feet of incandescent materials, I would have thousands of inches of mild luminous surface, the lamps being concealed, so that it should have as much as possible the effect of the emission of daylight, instead of visible artificial light. At the same time there are many points connected with the decorations and general style that might render it desirable not to push this too far. I think, therefore, that, with the conjoint use of the ceiling and the sides, I should be able to take away, if not the whole, yet at least perhaps 99 per cent. of that unpleasant feeling which is dependent upon excessive local light, accompanied by excessive heat.

221. Your object is to prove that it is possible to remove the lights entirely out of the House, and that consequently it will be unnecessary to have any attendance inside the House to conduct the lighting?—Certainly, that is one object.

222. For the purpose of rendering the light more agreeable to the House, and more suitable to good ventilation, you propose to light the House, if possible, from the exterior?—Entirely from the exterior of the usual line of vision within the House; either from the windows, or from the ceiling, or from both.

223. Was it under your direction that the old House of Commons was lighted?—Not generally.

224. Therefore the species of lighting which you would propose for the present House is not exactly that which was adopted in the late House?—I will state in a few words the general arrangements connected with the lighting of the old House. When I was called to the old House of Commons, I was not allowed to touch the lights; they said, "Do what you will for the acoustics and the ventilation, but take it as a fixed and settled point that wax candles remain." This went on for some time; at last, on one occasion, I was with the late Sir Benjamin Stephenson and the late Earl of Bessborough, and on my reminding them of the anxiety I had repeatedly expressed to have it on a proper footing, and saying that I could never manage with the lights, such as they were, so well as I could otherwise, they said, "Well, then, what do you say as to gas?" I said, "If you will give me 24 hours, I will demonstrate to you what I can do." They gave me those 24 hours, but, after I had worked two, the party who had contracted gave up everything. I took a cab, got 40 men together by twelve o'clock at night, and at half-past three in the afternoon, the first experiment of external lighting was made; but the lights had no proper burners. The next stage in the process was a recommendation of Mr. Barry's, that Mr. Gurney should be employed to light; upon which a communication was addressed to me. I replied, that I did not think that anything would come up to gas, but, if he should guarantee what he proposed to guarantee by the oxygen and oil, they should at least give him an opportunity of trying it. Thus on recommendation came the Bude light, which was oxygen and oil; after that the gas came in, and an arrangement of burners was used identical, so far as ventilation existed, with that previously shown by me in the papers of the House of Commons; it was different in the employment of the burners, concentric rings were used. Then this immediately altered the ventilation, because we had great heat upon the brows of the members; but still, on the other hand, we had the lamps thoroughly ventilated. Lamps were then introduced outside; the arrangements for ventilating all those lamps were again prepared under Mr. Gurney's name; but I made these arrangements, and did everything possible to facilitate the experiment. After that another series of arrangements was made in 1844. Then, when it was considered desirable by Sir Charles Barry himself that the House of Commons should see the practical system of lighting then recommended by me, and that they should express an opinion upon it, in 1844 I put up what I consider the final arrangement, after numerous preliminary experiments, from 1844 to 1851; when the House was pulled down, those arrangements were there; but I never had an opportunity of once getting them used during the sitting of the House. That is my connection with the lighting.

225. Then, in point of fact, although the arrangements, in part, passed through your hands, the lighting of the late House was according to Mr. Gurney's plan?—It was.

226. The plan, therefore, that you now propose for the lighting of the new House is not a plan that has ever been tried before?—Yes; it was tried in the House for some time, but never with the burners recommended by me. In the discussion which I had with Sir Frederick Trench and Mr. Greene, I recommended that Mr. Gurney's Bude light of oxygen and oil should be tried. I said that without trying it; it was impossible to know whether he could do what he proposed to do; and I believe that, if the original letters are still existing, my recommendation will be found that it should be tried, but at the same time I expressed my belief that they would come to gas, as Mr. Gurney did come.

227. Has the system which you propose for adoption in the new House been sufficiently tried to enable you to pronounce positively as to its effect?—Most certainly, so far as I am entitled to give an opinion, from what I have seen here and elsewhere.

228. A part of the lighting of the old House of Commons was from the outside, and a portion of it was inside the House?—Yes.

229. The difference between that and your proposition is, that you would propose to take the entire lighting outside the House?—Not only that; the great difference between my lighting and that which was used in the old House would be this: that my light would never come through curved glass. I consider that the great beauty of wax candles arises from the light never being refracted and twisted; but in a large lamp, where the light goes through large portions of curved glass, there are practically beams here and there, so that you have a reticulated texture of light throughout the whole building; now, my object is to avoid all that. Instead of having concave surfaces, where a reflector is used, I should have a convex surface of plaster of Paris tinted, dispersing and equalising the light. Instead of the light passing through large portions of glass, refracting beams here and there, I should have either glass absolutely plane in surface, or no glass at all; I prefer having no glass at all. I have got here the "Illustrations referred to in Dr. Reid's Letter to Viscount Dungannon in March, 1838" (*producing the same*). The committee will find that, though there have been patents upon patents taken out since for ventilating lamps, they are all in principle included here.

230. Your great object in proposing this alteration is, that the light should be external to the House, and should pass through flat glass?—Or none at all; from thousands of observations, I think the light infinitely less trying to the eye when it does not come through glass.

231. Then your proposition would involve the removal of the present stained glass in the windows, would it not?—Certainly, if it is lighted at the side; if it was lighted from above alone, then that would not be necessary; but I should not consider it desirable to lose the lateral light. I think the lateral light upon the countenance, instead of perpendicular light alone, is an object of infinite consequence in a house of assembly, particularly when there is so much black in the clothing, and so much green upon the floor.

232. You propose to substitute for the present enamelled panels glass panels, as far as you desire that they should be of glass?—That I should wish to be able to show. I have arrangements altogether peculiar for those illuminated panels in the ceiling, which hold out a completely new field of architectural decoration. I should propose that, without touching a portion of the ribbed work, the plain panels should be taken out, which could be very easily done by unscrewing below. We should then have a very subdued light, like the light from a candle, and secure the absorption of heat; there being certain materials which are known to absorb heat to a limited extent, and not to absorb light. I should use those as far as practicable.

233. Do you conceive that, if the House were to determine upon this species of lighting, the change would involve either any very

great difficulty or any very great expense?—I can imagine no difficulty. I have gone over and over again through every detail as to the expense; and I have estimated generally, as far as time will permit, the whole of these works, and I make the amount under £3000. And I would observe further, as to the experiments with the lighting, the expense would be principally labour and materials; the materials being valuable for any other purpose, even if the House should not eventually approve of the alterations.

234. Do you imagine that any experiments in this matter of lighting could be made without going into any very great expense, such as would satisfy the committee or any small number of members as to the merits of your plan?—I have no doubt that experiments could be made with the ceiling with one or two lights. At the same time, considering the immense importance of the matter, and the trifling additional expense of a mere temporary removal of the panels, I should strongly urge that the experiment should be done throughout. I estimate the removal of panels in the ceiling at about £10.

235. The panels could be removed without injury, and returned if the alteration was not approved?—Perfectly.

Edward Dawes, Esq., a Member of the House, examined.

245. CHAIRMAN.] Have you attended the House frequently since the meeting of Parliament?—Almost every day.

246. Have you been inconvenienced from the ventilation of the House?—I have suffered very much in consequence of the excessive glare of the gas; I have experienced constant oppression upon the brain after sitting in the House two or three hours, and I have been obliged to go out to get relief; and, on going home, I have been obliged to sponge the forehead with *eau de Cologne*, or something of that kind, to obtain relief from the excessive oppression of the brain. On the 12th of this month I was taken very seriously ill and obliged to go out of the House, and I was confined to my room nearly ten days, in consequence of what I should term nervous fever, which I trace immediately to the effect of the foul air of the House, and to the excessive glare of the gas lights, which I found intolerable. I came up in a perfect state of health when Parliament met, but I have found my health gradually getting worse in consequence of my attendance upon the House.

247. Do you attribute it entirely to the glare of the gas light, or to the atmosphere itself being bad?—I attribute it partly to the excessive glare of the gas lamps, and also to the smell of gas; I have gone several times into the gallery to see the effect of it there, and I found it utterly impossible to live in a state of health for any number of hours in the galleries, in consequence of the disagreeable smell of gas, and the bad state of the atmosphere.

248. Do you feel it as bad in the body of the House as in the galleries; or do you make a decided distinction between the two?—I make a distinction between the body of the House and the galleries: the body of the House is much better than the galleries; I do not consider it possible to live in the galleries so as to maintain one's health at all for any number of nights. During the last session of Parliament, I sat in the House constantly night after night during very long discussions upon the Papal question, and never received any injury beyond the natural fatigue arising from being kept up late constantly night after night. I was often in the House till one or two o'clock in the morning, but I never experienced the slightest inconvenience to my health, more than the ordinary fatigue of sitting up; but it is very different in the new House.

249. Viscount EBRINGTON.] You, like many other members, have heard very numerous complaints from other members to the same effect?—I have heard several complaints; one member mentioned to me that he was obliged to save himself by getting away into the country; he thought, otherwise, he should have fallen into a dangerous illness.

250. CHAIRMAN.] Have you felt draughts of air much in the House?—Yes, I caught cold one evening by encountering a very cold blast on going out of the door, a tremendous current of cold air which cut me up completely; I caught cold in consequence, and since the 12th of March I have been constantly ill from the effect of the gas and the glare. I am scarcely sufficiently recovered at this time to attend to my business.

251. Mr. DEEDES.] Were you ever before subject to living in a room heated by gas previously to coming into the present House of Commons?—No, I was not, but I have been accustomed to be in rooms lighted with gas, and I never felt any inconvenience. It appears to me that the glare is too great for the brain to bear; it produces an excessive pressure upon the forehead; sometimes there has been a swelling of the forehead, so that the heat has become very painful and disagreeable. At other times, after sitting in the House two or three hours, I have felt a sort of apoplectic sleep come over me, which I felt it impossible to shake off, and I believe that, if any one had shaken me, it would have been impossible to have shaken off that sort of apoplectic sleep.

252. CHAIRMAN.] From what you have stated, it appears that the remarks which I made in describing the ventilation of the House will very accurately describe your own feelings?—Most accurately; I stated to my friends on reading your observations, though I did not happen to hear them, that you had described the thing very accurately.

(To be continued.)

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TO Messrs. REIDY and CO., Cook-STREET, CORK.
White's Patent Hydro-Carbon Gas Office,
51, King-street, Manchester, July 17, 1852.
Gentlemen,—The statement put forward by Mr. Joshua Edmundson, of Dublin, or his agent, as to his having been offered a commission by this Company, is entirely groundless. Mr. Edmundson is agent for a project for destroying the illuminating power of gas, called "Webster's Patent"; and his object, therefore, in having the above misstatement circulated, is evident enough. I repeat that, directly or indirectly, he has never been offered an agency or commission by the "Hydro-Carbon Gas Company"; that he has never been in correspondence with any one connected with it on the subject; and that the statement is, consequently, utterly groundless.
We are much more cautious in selecting agents than this gentleman would lead the public to imagine.
Next in inconsistency to the promulgation of the misstatement referred to, is his endeavour to press on the Irish public that chemical absurdity known as "Webster's Patent Gas"—for some time utterly exploded on this side the Channel. Either Mr. Edmundson has been misled by the parties who placed the sole agency in his hands, or he is misleading the public. The list of references which have been circulated by him have been placed in my hands. I, therefore, made some inquiries. The number of references given by Mr. Edmundson to places in England where "Webster's Patent Gas" was in *successful* operation was seven. The first and most important place was Rugby; here I find the process was given up as impracticable. Here we were told also that another of his references was just as bad. A third of the references—Leicester Union Workhouse—was given up also, and the apparatus entirely removed. Further inquiries into those creditable references was needless. If they had not gone out of their way to circulate misstatements concerning this Company, I would not have troubled you, nor wasted my own time in writing this letter. A few weeks will serve to expose this in Ireland as completely as in England.
I am, gentlemen, very respectfully yours,
W. G. GINTY, Engineer and Manager.

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(Directors and Managers of Gas Works are earnestly requested to enable us to rectify any errors and fill up the omissions in the following List.)

The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£	**ENGLAND.**	£ s. d	£ s. d	£ s. d
		Aberdare			
		Aberystwith			
		Abingdon			
		Accrington £7000		5 0 0	
		Albrighton			
		Alcester			
		Alford, Lincolnsh.			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0	6 0 0	
		Amlwch			
160	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	6 0 0	11 0 0
		Appleby			
		Arundel			
		Ashbourn, Derby			
		Ashburton			
		Ashby-de-la-Zouch			
		Ashford, Kent			
1600	25	*Ashton-under-Lyne*	25 0 0	10 0 0	52 0 0
		Atherstone			
		Axminster			
200	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk			
		Bacup, Lancashire			
		Bakewell			
		Baldock			
140	25	Banbury	25 0 0	10 0 0	50 0 0
		Bangor			
500	5	Barking, Essex	4 10 0	5 11 0	5 0 0
250	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnet			
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	5 0 0	23 0 0
		Barton			
120	25	Basingstoke	25 0 0	8 0 0	28 0 0
2400	20	*Bath*	16 0 0	6 0 0	25 to 30
		Battle £2000		6 0 0	
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beaumaris			
		Beccles, Bungay, and Lowestoft			
		Bedford			
		Bedworth			
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
		Berkhempstead			
700	5½	Berwick-on-Tweed	5 10 0	6 8 0	5 15 0
		Beverley			
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
160	10	Bicester	10 0 0	5 0 0	10 0 0
		Bilston £15,100		8 0 0	
		Billericay			
		Bingley £7400		4 0 0	
		Birkenhead £70,000	35 0 0	3 0 0	35 to 37
2400	50	*Birmingham and Staffordshire*	50 0 0	10 0 0	96 to 97
	25	*Ditto*, new shares	7 10 0	10 0 0	10 pm.
928	75	*Birmingham*	75 0 0	10 0 0	149 to 151
		Bishop's Auckland			
140	25	Bishop's Stortford	25 0 0	5 0 0	24 0 0
		Blackburn £30,000		10 0 0	
		Blackpool			
		Blandford			
		Blythe			
		Bodmin			
		Bognor			
		Bolton £38,582		9 19 5	
		Boroughbridge			
		Boston £8000		10 0 0	
200	10	Bourn	10 0 0	5 0 0	
		Brackley			
		Bradford, Wilts			
		Bradford, Yorksh. £45,000		9 10 0	
		Brampton, Cumb.			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
		Brierly Hill			
2250	20	*Brighton*	20 0 0	5 0 0	15 to 17
1125	20	„ new shares	16 0 0	5 0 0	10 to 12
		Brighton and Hove £50,276		3 10 0	
4250	20	*Bristol*	20 0 0	9 0 0	37 0 0
1725	25	*Bristol and Clifton*	25 0 0	6 0 0	25 0 0
		Brixham			
		Braintree			
750	50	*Brentford*	50 0 0	6 0 0	44 to 46
800	25	„ new shares	11 0 0	6 0 0	11 0 0
		Brentwood			
		Bridgwater £6000		5 0 0	
400	10	Bridlington	10 0 0	5 0 0	10 0 0
		Bridport			
		Brigg			
		Broadstairs			
100	50	Bromley, Kent	50 0 0	6 0 0	52 10 0
		Bromsgrove			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
100	25	Buckingham	25 0 0	5 0 0	25 0 0
		Bungay (see Becls.)			
		Burford			
		Burnley £19,946		4 10 2	
		Burslem & Tunstall			
		Burton-on-Trent			
		Bury, Lanc. £6570			
		Bury St. Edmund's		5 0 0	
200	10	Buxton	10 0 0		
		Callington			
		Calne, Wilts			
		Camborne			
		Cambridge £34,560		7 0 0	
240	50	*Canterbury*	50 0 0	6 0 0	57 to 58
240	25	*Ditto*, second issue	25 0 0	6 0 0	28 to 29
		Cardiff £12,000		7 10 0	
		Carmarthen			
		Castleford			
		Chapel on the Frith			
		Chard			
		Chatteris			
		Cheadle			
		Chelmsford			
		Cheltenham £18,732		8 10 0	
		Chepstow			
		Chertsey			
230	10	Chesham, Bucks	10 0 0		
		Chester			
		Chester-le-Street			
		Chesterfield £13,123		4 17 6	
240	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
		Chirk			
		Chorley			
		Christchurch			
		Chudleigh			
		Cirencester			
		Clifton (Bristol and			
		Cleckheaton, York.			
		Clitheroe			
		Cockermouth			
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
		Coggeshall			
		Congleton £5000		5 0 0	
		Cowbridge			
		Corsham			
800	25	*Coventry*	25 0 0	6 0 0	24 to 25
		Cowes			
		Crewkerne			
		Croydon £20,000		5 0 0	
		Cranbrook £1900		5 0 0	
		Crayford			
		Crediton			
		Crewe, Cheshire			
		Cricklade			
		Darlaston			
		Darlington			
250	20	Dartford	20 0 0	7 10 0	27 0 0
		Dartmouth			
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Salop			
		Dawlish			
		Dedington			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	Deptford	10 0 0	5 0 0	1 to 2
325	50	*Derby*	50 0 0	10 0 0	
90	20	Dereham (East)	20 0 0	4 10 0	
1000	5	*Dewsbury*	5 0 0	10 0 0	8 12 6
		Devizes			
4000	5	*Devonport*	5 0 0	6 0 0	6 5 0
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	20 10 0	5 0 0	21 10 0
		Douglas, Isle of M.			
209	56½	*Dover*	56 10 0	5 15 0	71 to 72
		Downham			
		Driffield			
		Droitwich			
600	20	*Dudley*	20 0 0	4 0 0	18 to 20
		Droylsden			
		Dunmow			
		Dunstable			
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
300	10	Eastbourne			
		East Grinstead			
		Elland			
		Ellesmere			
		Eltham			
		Enfield			
300	19	Epsom and Ewell	19 0 0		
		Evesham			
		Exeter £40,000		10 0 0	
		Exmouth			
		Eye, Suffolk			
		Fairford			
64	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
		Fareham			
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
		Ferrybridge			
		Fleetwood			
300	10	Folkestone	10 0 0	10 0 0	15 0 0
240	10	„ new shares	8 0 0	10 0 0	13 0 0
		Fowey			
240	5	Framlingham	5 0 0	5 0 0	5 0 0
		Frome			
		Garstang			
		Gillingham, Dorset			
		Glastonbury			
		Glossop £10,000		9 0 0	
1000	25	*Gloucester*	25 0 0	7 10 0	28 0 0
		Gomersal			
		Godalming			
		Gosport			
		Grantham			
20		Gravesend	20 0 0	5 0 0	21 0 0
1000	10	*Great Grimsby*	8 0 0	8 0 0	12¾ to 13¼
1000	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hales Owen			
300	6	Halesworth	6 0 0	7 10 0	5 10 0
		Halifax £15,000		10 0 0	
		Halstead			
		Hampton Court			
		Harrogate £10,000		5 0 0	
		Harrow on the Hill			
		Hartlepool £15,137		7 10 0	
		Haslingden, Lancsh.			
330	50	Hastings and St. L.	50 0 0	6 0 0	60 0 0
		Havant			
		Haverhill			
		Haworth, Yorks.			
		Hayle			
		Helstone			
		Hemel Hempstead			
300	10	Henley-on-Thams.	10 0 0		
		Hereford £5300		4 0 0	
		Herne Bay			
270	10	Hexham	10 0 0	7 0 0	12 0 0
		Heywood £10,000		5 0 0	
		Highworth (Wilts)			
230	10	Hinckley	10 0 0	5 0 0	7 0 0
		Hindley, Lancash.			
		Hitchen			
		Hythe			
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see British Provincial)			
		Honiton			
		Horncastle			
10		Houghton-le-Sprg.	10 0 0	8 0 0	
		Horsham			
		Howden			
		Hull, Sculcoats (see British Provin.)			
		Hull, £11,712. 10s.		5 0 0	
		Hunmanby			
210	10	Hungerford	10 0 0	5 0 0	10 0 0
		Huddersfield			
520	5	High Wycombe	5 0 0	6 0 0	6 16 0
		Idle and Eccleshill			
		Ilkeston			
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
1400	10	*Ipswich*	10 0 0	8 0 0	15 0 0
1400	10	„ new shares	7 10 0	8 0 0	12 10 0
800	25	*Isle of Thanet*	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
		Kenilworth			
		Keswick			
100	25	Kettering	25 0 0	5 0 0	25 0 0
		Kiddermins. £10000		5 0 0	
		King's Langley			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, Lanc.			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
		Leamington Priors £22,500		6 0 0	
		Leatherhead			
		Ledbury			
		Leeds Old Comp., old stk., £60,300		10 0 0	
		new „ £23,775		6 0 0	
		Leeds New £60,000		10 0 0	
		Leek			
		Leicester £36,230		7 0 0	
		Leigh			
135	20	Leighton Buzzard	20 0	5 0 0	
		Leominster			
		Leyburn, Yorksh.			
		Liskeard			
330	25	Lewes	25 0 0	5 0 0	25 0 0
		Lincoln £8000		10 0 0	
		Leyland, Lancash.			
		Littlehampton			
250	20	Lichfield	20 0 0	10 0 0	30 0 0
		Liverpool United	100 0 0	10 0 0	209 to 211
		„ ½ sh.	25 0 0	10 0 0	52 to 53
		Langport			
		London Comps.—			
5000	40	*British*	18 0 0	1 18 10	12 0 0
5000	20	„ Provincial— (Holywell, Hull, Norwich, Potteries, Trowbridge)	20 0 0	7 0 0	20 to 22
	20	„ Prov., new	14 0 0	7 0 0	12 to 14
4000	25	*Commercial*	25 0 0	6 0 0	30 to 32
2000	25	„ new shares	2 10 0	6 0 0	par to 2pm
		„ deb. £12,000			
12,000	50	*Chartered*	50 0 0	4 0 0	36 to 37
6000	50	„ new shares	10 0 0	4 0 0	6 to 7
2000	150	*City of London*	150 0 0	4 0 0	125 to 126
4000	50	*Equitable*	50 0 0	2 10 0	25 to 26
		„ deb. £46,000			
10,000	20	European— (Amiens, Boulogne, Caen, Havre, Nantes, and Rouen)	20 0 0	5 0 0	11 to 13
2000	20	„ do. new	7 0 0	5 0 0	5 to 6

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
15,000	10	*Gt. Cntl. Consumers*	10 0 0	10 0 0	14 to 14¼
		Impl. Continental —First capital (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam).....	42 0 0	6 11 0	44 to 46
7000	50	Second capital—(Aix la Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Marseilles, Toulouse Vienna)	41 0 0	10 7 0	68 to 70
	50	Third capital ...	43 10 0	9 4 0	65 to 70
10,000	50	*Imperial*	50 0 0	6 0 0	75 to 80
3000	50	„ new shares	45 0 0	6 0 0	65 to 67
		„ debentures £50,500			
4000	40	*Independent* ...	40 0 0	6 0 0	46 to 47
3000	50	*London*	50 0 0		2 10 0
6000	25	„ preference	25 0 0	6 0 0	25 0 0
3000	50	„ 2nd do. ...	50 0 0		15 to 18
9000	50	*Phœnix*	49 0 0	3 10 0	26 to 27
1000	100	*Ratcliff*	90 0 0	5 0 0	60 to 65
4000	25	*South Metrop.* ...	25 0 0	5 0 0	20 to 22
7000	10	Surrey Consumers'	10 0 0	4 0 0	
9000	50	United General—(Cork, Dublin, Limerick)	50 0 0	2 0 0	20 to 22
12,500	20	Western	20 0 0	2 0 0	10 0 0
		Lostwithiel			
		Loughborough.....			
240	25	*Louth*.....	25 0 0	6 0 0	26 10 0
		Lowestoft (see Bec.			
611	5	Ludlow Union.....	5 0 0	6 0 0	5 0 0
		Luton.....			
		Lutterworth.....			
		Lyme Regis			
		Lymington			
		Malmesbury.....			
		Macclesfield 32,000		3 15 0	
		Maidenhead.....			
300	50	*Maidstone*.....	50 0 0	10 0 0	90 0 0
		Maldon			
		Marlborough			
		Malton (New).....			
		Malvern.....			
		Manningtree			
		Mansfield £5000		10 0 0	
		March			
		Margate (see I. of T.			
		Market Deeping...			
		Market Drayton ...			
132	25	Market Harboro'	25 0 0	6 0 0	30 0 0
		Market Raisin.....			
		Market Weighton			
		Marlow			
370	10	Maryport	10 0 0	6 0 0	12 0 0
		Melksham.....			
		Melton Mowbray .			
		Merthyr Tydvil ...			
		Mere			
		Middleton £9033		5 0 0	
		MidsummerNorton			
		Middlesboro'			
		Mildenhall			
		Mitcham			
		Mold			
700	10	Monmouth	10 0 0	5 0 0	
		Monk Wearmouth			
		Moreton in Marsh			
		Morley			
		Mottram			
		Morpeth			
		Nantwich			
		Neath.....			
		Needham Market..			
		Newark..... £5000		10 0 0	
250	20	Newbury	20 0 0	5 0 0	20 0 0
13,000	5	Newcastle & Gateshead Union	5 0 0	8 0 0	8 0 0
		Newcastle-under-Lyme £6200		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	5 0 0
		Newnham, Glost.			
		Newent			
		New Mills £2115			
		Newport, M. £11720		8 0 0	
320	50	*Newport, Isle of W.*	38 0 0	4 0 0	5 0 0
		Newport Pagnell			
		Newport, Salop ...			
		Newton Abbot.....			
		Newton, Lanc.....			
		Northallerton			
		North Walsham ...			
542	20	*Northampton*	18 0 0	10 0 6	27 0 0
		Northwich			
		Norwich (see British Pro. £40,000		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
900	50	New shares		10 0 0	
		Nuneaton			
		Oakham.....			
		Oakhampton			
200	10	Odiham, Hants.....	10 0 0	4 0 0	10 0 0
		Oldham			
		Olney			
		Ongar.....			
		Ormskirk			
		Otley, Yorkshire...			
		Oundle			
120	150	*Oxford*	150 0 0	8 0 0	260 0 0
		Over Darwen £8000		5 0 0	
		Padstow.....			
		Pately Bridge, Yrk.			
250	20	Penrith	15 0 0	6 10 0	21 0 0
		Penryn			
		Penzance			
200	10	Petworth	10 0 0	8 0 0	12 0 0
		Petersfield			
		Pickering			
3000	10	*Plymouth*	10 0 0	10 0 0	11 0 0
		Pocklington			
		Pontefract.....			
		Pontypridd			
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc.....			
600	50	*Portsea Island* ...	53 0 0	5 0 0	45 to 47
400	10	Prescott.....	9 0 0	4 13 4	7 0 0
3000	20	*Preston*	20 0 0	10 0 0	
		Pwllhelli.....			
		Pudsey ...£12,000		5 0 0	
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate (see I. of T			
		Ravenglass			
1000	10	*Reading*.....	10 0 0	4 0 0	7 0 0
500	20	*Reading Union* ...	20 0 0	6 0 0	17 0 0
		Redditch			
		Redruth.....			
		Reigate			
		Retford (East).....			
		Rhyl			
		Richmond (Surrey)			
		Ringwood			
		Ripon.....			
		Rochester and Chatham £20,000		6 0 0	
		Rochford			
		Rockingham.....			
		Romford			
		Ross			
215	25	*Rotherham*	25 0 0	6 0 0	40 10 0
		Royston.....			
		Ruabon			
		Rugby			
		Rugeley.....			
		Runcorn... £11,000		7 10 0	
		Ruthin			
500	10	Ryde	10 0 0	6 0 0	12 0 0
		Rye.....			
		Romsey			
		Saddleworth.....			
225	20	Saffron Walden ...	20 0 0	3 15 0	19 0 0
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St. Helier's (Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St. Peter's Port, (Guernsey)			
320	25	Salisbury	25 0 0	6 0 0	28 to 30
		Sandbach			
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough.....			
		Sedburgh			
		Selby			
		Settle			
290	10	Sevenoaks.....	10 0 0	5 0 0	10 0 0
		Shaftesbury			
5400	25	*Sheffield United* ...	24 0 0	8 6 8	30 0 0
		Shelton, Potteries (see Brit. Prov.)			
		Shepton Mallet ...			
		Sherborne.....			
2914	5	Shields (Tyneouth,	5 0 0	3 0 0	5 0 0
		Shields (South) ...			
		Shiffnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	5 12 6
		Shipston-on-Stour			
		Shoreham			
		Shrewsbury £10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
		Sleaford.....			
350	10	Slough	10 0 0		
		Snaith			
		Soham			
		Southwold.....			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
		Sowerby, Yorksh.			
		Stretford			
		Stokesly.....			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bdg. £15,000		10 0 0	
		Stamford £11,250		3 0 0	
		Stockton-on-Tees £7980		9 5 0	
840	9½	Stockton, New	9 10 0	9 0 0	8 0 0
960	10	Stoke-upon-Trent	10 0 0	7 0 0	11 10 0
500	10	„ new shares	6 0 0	7 0 0	7 10 0
		Stone, Stafford.....			
		Stoney Stratford ...			
		Stourbridge			
		Stowmarket.....			
150	20	Stratford-on-Avon	20 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham.....	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury.....			
		Sunderland, old....			
6400	5	*Sunderland*, new ..	5 0 0		
		Sutton			
		Swindon.....			
		Sydenham.....			
2800	5	*Taunton*.....	5 0 0	None	2 10 0
		Tadcaster			
		Tamworth.....			
		Tavistock.....			
		Teignmouth.....			
		Tenbury.....			
		Tenby.....			
		Tenterden £2000		2 10 0	
		Tetbury, Gloster..			
		Tewkesbury			
		Thame			
		Thetford			
		Thirsk			
		Thornbury.....			
		Thorne.....			
		Tiverton			
670	5	Todmorden.....	3 0 6		
		Torquay.....			
		Torrington, Devon			
		Totnes			
		Totnes Consumers			
4000	5	Tottenham	3 10 0	6 0 0	3 0 0
		Towcester.....			
200	10	Tring	10 0 0	5 0 0	10 0 0
		Trowbridge (see British Provin.)			
75	50	Truro	50 0 0	2 0 0	
		Tunbridge.....			
		Tunbridge Wells...			
		Ulverston.....			
		Uppingham			
210	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk, Monmouth ...			
		Uttoxeter.....			
		Uxbridge			
		Ventnor.....			
1000	25	*Wakefield*, old capl	25 0 0	6 0 0	25 0 0
1600	5	„ new „	5 0 0	6 0 0	5 0 0
300	10	Wallingford	10 0 0	5 0 0	8 0 0
		Wandsworth.....			
		Wantage.....			
		Warrington £23304		10 0 0	
100	10	Wareham	10 0 0	3 10 0	8 0 0
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford.....			
		Welchpool, Mntgy.			
		Wellingborough ...			
		Wellington, Salop			
		Wellington, Smrst.			
		Wells, Smrst. £5000		7 10 0	
		Westbury.....			
		Weston-sup.-Mare			
2000	5	West Ham	5 0 0	6 0 0	5 0 0
		Whitby			
		Whitehaven			
		Whitstable			
		Whittlesea			
		Wigan £10,160		10 0 0	
		Willenhall.....			
		Winchelsea.....			
		Winslow			
240	10	Wimborne Minster	10 0 0		
		Wincanton.....			
360	50	Winchester	50 0 0	6 0 0	
900	12½	Windsor.....	12 10 0	10 0 0	23 0 0
		Witham.....			
		Witney.....			
4448	10	*Wolverhampton* ...	10 0 0	7 10 0	17 10 0
		Woburn.....			
210	10	Wokingham	10 0 0		10 0 0
		Woodbridge			
		Wooler			
		Wotton-un.-Edge			
		Worcester £29,000		8 0 0	
		Workington			
		Worksop & Radford			
		Wirksworth			
		Worthing.....			
		Wrexham			
		Woolwich Equitbl.			
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham.....			
		Yarm			
795	20	Yarmouth.....	20 0 0		17 to 18
		Yeadon, near Leeds			
		Yeovil			
		York Untd. £55,000		7 0 0	
		SCOTLAND.			
	5	Aberdeen	3 0 0		3 16 6
		Airdrie			
		Alloa			
		Annan			
		Anstruther.....			
		Ardrossan			
550	20	Arbroath	20 0 0	7 10 0	27 10 0
		Auchterarder.....			
750	2	Auchtermuchty	2 0 0	6 0 0	2 7 6
		Ayr, old			
		Ditto, new.....			
		Banff.....			
		Barrhead			
		Bathgate.....			
		Beith.....			
		Bervie			
		Biggar			
		Blairgowrie			
400	6	Borrowstowness ...	6 0 0	5 0 0	8 0 0
		Brechin			
		Bridge of Allan ...			
	2	Broughty Ferry ...	2 0 0	5 0 0	2 0 0
		Burntisland			
		Campbelton			
		Clackmannan			
		Coatbridge.....			
		Coldstream			
		Collinsburgh			
		Comrie			
		Crieff.....			
		Crail, Fife			
		Cullen			
		Cumbernauld			
		Cumnock			
600	5	Cupar Angus	5 0 0	6 0 0	5 10 0
250	10	Cupar Fife	10 0 0	7 10 0	14 0 0
		Dalkeith.....			
		Denny			
		Dingwall.....			
		Dornoch			
		Douglas.....			
		Dumbarton.....			
400	20	Dumfries	14 0 0	5 0 0	20 0 0
		Dunbar.....			

Number of Shares issued.	Amount per Share £	Name of Company.	Amount paid up per Share £ s. d	Dividend per Cent. per Ann. £ s. d	Price. £ s. d
		Dunblane			
	23½	*Dundee, old* £29,687	23 15 0	8 8 0	30 10 0
8000	5	*Dundee, new*	5 0 0	4 0 0	4 0 0
860	10	Dunfermline	10 0 0	6 0 0	12 12 0
		Dunkeld			
		Dunse			
		Dysart			
6000	25	*Edinburgh Gas Co.*	25 0 0	10 0 0	53 10 0
	25	,, *and Leith Co.* £98,640	18 0 0	7 10 0	27 13 6
		Elie			
		Elgin			
		Falkirk, old			
		,, new			
		Falkland			
		Ferry Port on Craig			
		Fochabers			
		Forfar			
		Fort William			
		Fraserburgh			
		Galashiels			
		Garlieston			
		Gatehouse n. Fleet			
		Girvan			
	25	*Glasgow* £122,500	25 0 0	10 0 0	50 0 0
15000	10	*Glasgow City and Suburban*	10 0 0	9 0 0	19 17 6
		Grangemouth			
		Grahamston			
		Haddington			
		Hamilton £7500		8 0 0	
		Hawick			
		Helensburgh			
		Huntly			
		Inverary			
400	1	Inverkeithing	1 0 0	5 0 0	1 0 0
1200	10	*Inverness Gas and Water*	10 0 0	7 10 0	15 0 0
2400	5	,, new shares	1 5 0	7 10 0	2 5 0
		Irvine			
		Jedburgh			
		Johnstone, near Paisley			
		Keith			
		Kelso		10 0 0	
		Kilmarnock			
		Kincardine			
		Kinghorn			
		Kingskittlo, Fife			
		Kinross			
		Kirkaldy			
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near Glasgow	3 0 0	5 0 0	3 0 0
227	5	Kirkwall	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			
		Largo, near Leven			
		Largs			
		Lasswade, n. Edin.			
		Lauder			
		Leith			
		Leslie, Fife			
		Lesmahago			
		Leven			
		Linlithgow			
		Linton, n. Nobleh.			
		Lochee, n. Dundee			
		Lochgilphead			
		Lochwinnock, near Paisley			
1200	1	Markinch	1 0 0	7 10 0	1 5 0
		Mauchline			
		Maxwell-town, n. Dumfries			
		Maybole, Ayrshire			
		Maryhill, near Glasgow			
		Melrose			
718	2	Mid & East Calder	2 0 0		2 0 0
192	5	Moffat	5 0 0		
	13½	Montrose	13 10 0	7 11 1	
		Musselburgh			
		Nairn			
		Neilston, n. Glasg.			
		Newmills, near Kilmarnock			
		Newburgh, Fife			
		Newton-on-Ayre			
		Newton Stewart			
		North Berwick, n. Haddington			
		North Queensferry			
		Oban			
		Peebles			
800	25	Perth	25 0 0	4 16 0	22 10 0
5	25	,, new	5 0 0		2 7 6
		Peterhead			
		Pittenweem			
		Pollokshaws, near Glasgow			
		Port Glasgow			
		Portobello, n. Edin.			
		Prestonpans			
		Rutherglen, near Glasgow			
		Renfrew, n. Paisley			
		Saltcoats			
		Sanquhar			
		Selkirk			
		South Queensferry			
		St. Andrew's			
		Stewarton			
		Stirling			
		Stonehaven			
		Stonhouse, Lanrks.			
		Stornoway			
		Stranraer			
		Strathaven, near Hamilton			
		Thurso			
		Tillicoultry, n. Alloa			
800	1	Tranent	1 0 0		1 0 0
		Troon			
		Wick			
		Wigton			
		Wemyss	4 10 0		

IRELAND.

Number of Shares issued.	Amount per Share £	Name of Company.	Amount paid up per Share £ s. d	Dividend per Cent. per Ann. £ s. d	Price. £ s. d
300	10	Armagh	10 0 0	8 0 0	14 10 0
		Ballinasloe			
700	50	*Belfast*	50 0 0		
		Ballymena			
		Ballymoney			
		Carrickfergus			
		Carlow			
		Cavan			
		Cork (see Un. Gen.)			
		Cookstown			
1300	5	Clonmel Consumrs	5 0 0	5 0 0	5 0 0
		Drogheda			
19,000	10	*Dublin Consumers*	6 0 0	7 0 0	8 10 0
		Dublin Hibernian (see United Gen.)			
160	25	Dundalk	25 0 0		22 0 0
		Dungannon			
871	5	*Downpatrick*	5 0 0	4 0 0	
		Ennis			
		Enniskillen			
		Enniscorthy			
210	25	Galway	25 0 0	10 0 0	32 0 0
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Larne			
		Limerick (see U.G.)			
1725	5	Limerick Consum.	5 0 0	5 0 0	5 0 0
600	15	Londonderry	15 0 0	6 13 4	21 10 0
500	7	Lisburn	7 0 0	7 10 0	8 5 0
520	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
448	5	Newtownards	5 0 0	4 0 0	5 0 0
		New Ross			
		Newry			
		Omagh			
125	20	Portadown	20 0 0	6 0 0	20 0 0
600	10	Sligo	10 0 0		
		Tipperary			
		Tralee			
		Waterford			
		Wexford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Ely.	Hertford.	Northfleet.	Sandwich.	Waltham Abbey.
Bridgenorth.	Farsley.	Holt.	Newport I. W. (new).	Seaham Harbour.	Ware. (2 works)
Carnarvon.	Gainsborough	Huntingdon.	Oswestry.	Sheerness.	Wem.
Chester, new.	Goole.	Hyde (Cheshire)	Peterborough.	Sidmouth.	Weymouth.
Deal.	Harleston.	Kingston-on-Thames.	Pontypool.	Sittingbourne.	Whitchurch (Salop).
Diss	Hatfield.	Lynn.	St. Alban's.	Spalding.	Wisbeach.

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Carlisle.	Greenock.	Lytham (Lanc.)	Rochdale.	Southport (Lanc.)	Walsall.
Cashel.	Haverfordwest.	Manchester.	Rothesay.	Stockport	Wells (Norfolk).
Coleraine.	Keighly.	Milton (Kent).	Richmond (Yorkshire).	Strabane.	Youghall.
Doncaster.	Knaresborough.	Paisley.	Salford.		

Price Current.

The following List of Prices is corrected by an eminent wholesale house in each trade up to the latest period:—

CASTINGS, per Ton.

Average Weight of Cast Iron Gas Pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London. £ s. d	Glasgow £ s. d	Newcastle. £ s. d	Wales. £ s. d	Yorksh., Derbysh. and Staffrdsh £ s. d
Pig Iron, No. 1	3 10 0	2 7 6	3 0 0	3 15 0	3 10 0
1½ and 2 inches Socket Pipes	6 10 0	5 0 0	5 10 0	5 15 0	5 15 0
2½ and 3 do. do.	6 0 0	4 15 0	5 7 6	5 12 6	5 12 6
4 and 5 do. do.	5 17 6	4 12 6	5 5 0	5 10 0	5 10 0
6 inches and upwards do.	5 15 0	4 10 0	5 2 6	5 7 6	5 7 6
Extra for bends, branches, and connection	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
Retorts, 2nd fusion, hot blast	5 5 0	4 10 0	4 17 6	4 17 6	5 0 0
Do. 2nd fusion, cold blast	5 15 0	..	..	5 5 0	5 5 0
Tank Plates, ¾ thick and above	5 10 0	4 17 6	5 0 0	5 7 6	5 17 6
Do. less than ¾	5 15 0	5 0 0	5 0 0	..	5 10 0
Plain Castings ex. models	5 15 0	5 0 0	5 0 0	5 10 0	5 10 0

COALS.

NEWCASTLE. Unscreened.	s.	d.	
Whitwell Primrose	4	6	per ton.
Burnhope	5	3	,,
Dean's Primrose	5	9	,,
Pelton, Brancepeth, Medomsley	6	0	,,
Pelaw	6	3	,,
Eighton Moor, Felling Main, New Pelton, Peareth, South Pelaw, Waldridge, Washington Hutton, South Peareth	6	6	,,
Ramsay's Cannel	12	0	,,
Cowen's Cannel	12	0	,,

DERBYSHIRE. Clay Cross, Deep Main, and New Birchwood	6s. 6d. per ton.
SCOTCH CANNEL. Boghead at Leith	19 0 ,,
Kirkness best	23 0 ,,
Capeldrae, first quality	20 0 ,,
Ditto, second quality	10 0 ,,
Lothian	18 0 ,,
Lesmahago at Glasgow	16 6 ,,
Ditto at Leith	18 0 ,,
Arniston	16 0 ,,
Wemyss	15 0 ,,
Donibristle	10 6 ,,
Bridgeness, Kinneil	11 0 ,,
Knightswood	10 0 ,,
Lochgelly, Lumphinan	9 6 ,,

FIRE GOODS.

Best Bricks, 50s. per 1000, at Newcastle.
Do. Clay, 12s. per ton do.

LEAD.

Soft pig, £18. 10s. per ton.

WROUGHT IRON TUBING, subject to 40 per cent. Discount.

	2 inches. s. d.	1½ inch. s. d.	1¼ inch. s. d.	1 inch. s. d.	¾ inch. s. d.	½ inch. s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Flanches	1 9	1 6	1 3	1 0	0 9	
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	
Ditto 1 quart	11 6	10 6	10 3	10 0	9 6	

FREIGHTS, per Ton.

Coastwise—Newcastle.	s.	d.		s.	d.
Chatham & Roches.	5	6	Weymouth	7	0
Cork	7	6	Yarmouth	4	3
Dover	6	0	*Foreign.*		
Dublin	8	0	Amsterdam	10	0
Exeter Quay	7	3	Boulogne	6	9
Folkestone	6	0	Barcelona	17	0
Hastings	7	0	Bordeaux	11	6
Ipswich	5	0	Calais	7	0
Jersey	7	6	Dieppe	7	6
London	5	6	Hamburg	7	6
Lowestoft	4	0	Havre	8	0
Lynn	5	6	Lisbon	11	0
Margate	6	3	Rotterdam	8	6
Portsmouth	7	0	Rouen	11	0
Plymouth	6	6	St. Petersburgh	10	0
Southampton	6	9	Stettin	9	6
			Trieste and Venice	19	0